FILE

Washington State Department of Transportation

MEMORANDUM

April 12, 2005

TO: J. Kapur/R. Zeldenrust
Bridge and Sturctures Office, MS 47340

FROM: Tony M. Allen/Mark A. Frye
EEP Geotechnical Branch, MS 47365

SUBJECT: SR-395, XL 2201
NSLAC – Francis Avenue to US 2 Structures
Bridge Foundation Report

Please find attached the geotechnical report for the SR 395, NSLAC Francis Avenue to US 2 Structures project. This report provides foundation recommendations for the US 395 Northbound Overcrossing at Fairview Road, the US 395 Northbound Overcrossing at Market Street, the US 395 Northbound Overcrossing at Parksmith Drive/BNSF, and the US 395 Undercrossing at Perry Street.

Please contact us if you have any questions or comments regarding the information presented herein.

TMA:maf

Attachment: Geotechnical Report

cc: Gion Gibson, Eastern Region Materials Engineer
Mohamed Sheikhizadeh, OSC Construction, MS 47354
Mike Gribner, Eastern Region Design Office

GEOTECHNICAL REPORT

SR 395 – NSLAC – Francis Avenue to US 2 Structures

XL-2201

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State Geotechnical Engineer

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Mark A. Frye
Geotechnical Engineer

Reviewed by:
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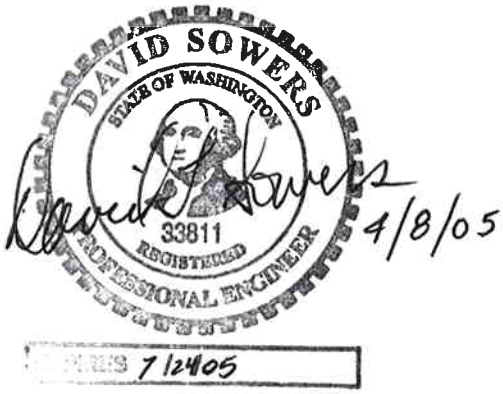

April 8, 2005

Washington State Department of Transportation
Douglas MacDonald
Secretary of Transportation

Environmental and Engineering Programs Division
Materials Laboratory
Geotechnical Division
P.O. Box 47365
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Table of Contents

1. INTRODUCTION

1.1. GENERAL

This report presents the results from a geotechnical study performed for the SR 395, North Spokane Limited Access Corridor (NSLAC), Francis Avenue to US 2 Structures project. The location of the project site is shown on the Vicinity Map, Figure 1 in Appendix A.

The analyses, conclusions, and recommendations provided in this report are based on our understanding of the project and site conditions existing at the time of our site review and field exploration program. The exploratory borings are assumed to be representative of the subsurface conditions at locations throughout the site. If during construction, subsurface conditions differ from those described in the explorations, we should be advised immediately so that we may reevaluate our recommendations and provide assistance.

This report should be made available to prospective bidders and the contractor in accordance with Section 1-02.4 (2) of the Standard Specifications.

1.2. PROJECT DESCRIPTION

The NSLAC project is located in northeast Spokane, between the Spokane River Bridge and the Little Spokane River. The project will entail construction of approximately nine miles of new, four to eight lane highway, up to seven interchanges, and their associated structures. The purpose of the project is to improve mobility through the city of Spokane and Spokane County between Interstate 90 (I-90), US 2, northeastern Washington, and Canada.

The project is divided into a number of sections for the purpose of design and construction. The Francis Avenue to US 2 Structures project will construct five bridges between Gerlach Road and Perry Street. This report provides foundation recommendations for four of those structures, including the US 395 northbound overcrossing at Fairview Road; the US 395 northbound overcrossing at Market Street; the US 395 northbound overcrossing at Parksmith Drive/BNSF; and the US 395 undercrossing at Perry Street. Geotechnical recommendations for the retaining walls necessary to transition from the approach fills to the aforementioned bridges will be provided in a separate report.

1.3. PREVIOUS STUDIES

Information on other geotechnical work performed in the project vicinity is included in the following reports:

- *Geotechnical Data Report, SR 395 – North Spokane Corridor, Section 1 – Hawthorn Road to US 2, Spokane, Washington*, prepared by Landau Associates Inc., February 6, 2001.

- *Geotechnical Data Report, SR 395 – North Spokane Corridor, Section 2 – From US 2 to SR 395*, prepared by Landau Associates Inc., March 26, 2001.

- *Geotechnical Data Report, SR 395 – North Spokane Corridor, Section 3 Spokane, Washington*, prepared by Landau Associates Inc., May 23, 2001.

2. PROJECT SUBSURFACE CONDITIONS

2.1. REGIONAL GEOLOGY

Bedrock and sedimentary units in the project area include, from oldest to youngest: Metamorphic and igneous rocks, the Latah Formation and Columbia River Basalt Group, Lake Missoula catastrophic flood deposits, and eolian deposits. These units are described in the following paragraphs.

The Spokane area is underlain by high-grade metamorphic rocks of the Spokane dome of the Priest River metamorphic core complex. The core rocks have been intruded by Cretaceous and early Tertiary granitic rocks. These rocks were deeply eroded, leaving a surface of considerable relief that forms a generally northwest trending mountain range with drainages extending into the lowlands to the south.

During the Miocene Epoch (late Tertiary), between 5 and 24 million years ago, extensive flows of basaltic lava flooded the region, covering the lower valleys and foothills and abutting the higher mountains. The basalt flows covered more than 100,000 square miles in parts of Washington, Idaho, and Oregon. Two formations of the Columbia River Basalt Group have been mapped in the area: the Wanapum Basalt (Priest Rapid Member) and the Grande Ronde Basalt. The Grande Ronde Basalt is between 15.6 and 16.4 million years old, and is generally designated as "valley" flows due mainly to exposures in valleys around the Spokane area. The Wanapum Basalt is between 15 and 14 million years old and is generally designated as "rim rock" flows mainly because it caps the bluffs in the project area.

The Columbia River basin is generally thought to be arcuate in shape, extending from near Grand Coulee, Washington to Moscow, Idaho. Lacustrine sediments, derived from erosion of the older basalts and the pre-Tertiary rocks in the region, were deposited in the basin. These sediments, consisting of primarily silt and clay, with minor sand and gravel, form the Latah Formation. The Latah Formation is generally described as poorly indurated siltstone, claystone, sandstone, and minor conglomerate, containing scattered volcanic ash layers. Little data is available regarding the general depositional nature of the Latah Formation, but sediment was likely deposited by drainages flowing into the basin from the east and north. Where exposed in the Spokane region, the Latah Formation generally overlies the Grande Ronde Basalt and underlies the Wanapum Basalt.

During the Pleistocene Epoch (early Quaternary), 10,000 to 2 million years ago, vast continental ice sheets periodically advanced into the Spokane valley. The latest advance, which occurred between about 12,000 and 22,000 years ago, had the greatest effect on the present day landscape. Melt water deposits, chiefly of sand and gravel, with silt and clay, were deposited in and along the valleys of the Little Spokane and Spokane Rivers. In addition, a proglacial lake, known as Lake Columbia, occupied much of the Spokane Valley during the Pleistocene. Remnants of the lake sediments exist in tributary valleys such as the

Peone Prairie north of Spokane (east of the project area). The glacial lake deposits consist predominantly of sand, silt and clay with scattered drop stones.

Glacial ice of the Purcell lobe is thought to have periodically blocked the Clark Fork River near the present day Idaho/Montana border, forming a great ice dam across the valley. Melt water from other ice lobes further up the Clark Fork River drainage became impounded behind the ice dam, forming a vast lake in present-day western Montana referred to as Glacial Lake Missoula. Periodically the ice dam failed, releasing an enormous volume of water that flowed across the landscape. The majority of this flood water rushed through the Spokane River and Little Spokane River valleys en route to the Columbia River.

Though the number of Pleistocene flood events are unknown, each flood event likely swept down the Spokane and Little Spokane River valleys scouring deposits of the previous flood events, cutting new channels into the pre-Pleistocene bedrock, and leaving behind new deposits of boulders, cobbles, gravel, and sand. In less energetic environments, slack water deposits of chiefly sand and lacustrine sediments were laid down.

Surficial deposits of wind-blown sand (Holocene [present to 10,000 years ago] and Pleistocene Epoch) are present over the flood deposits over much of the project area, south of Farwell Road. The wind-blown deposits (dunes) are derived primarily from Pleistocene flood deposits that mantle much of the project area.

As part of this study, we reviewed available geologic data for the project vicinity. The geologic map of the site, titled *Geologic Map of the Spokane 1:100,000 Quadrangle, Washington-Idaho* (Joseph, 1990), indicates the project area is underlain by wind-blown sand deposits. These deposits generally consist of unconsolidated fine to medium sand.

2.2. Field Exploration

Subsurface exploration for this project consisted of advancing one or more exploratory borings at or near the proposed location of each bridge pier. Our field exploration was conducted in general accordance with the 2003, *Checklist and Guidelines for Review of Geotechnical Reports and Preliminary Plans and Specifications,* FHWA publication ED-88-053. Appendix B contains copies of the boring logs and a detailed discussion of our exploration program. All boring logs should be made available to prospective bidders and included in the contract documents. Appendix C provides a discussion of the laboratory testing program and applicable test results. Appendix D contains photographs of rock cores retained during the exploration.

2.3. Soil Conditions

Based on our exploration program and laboratory testing, there are three general soil units underlying the proposed bridges, which is generally consistent with the available geologic mapping. These soil units are described below in more detail, as well as conditions encountered at each bridge site.

Unit 1 – Dunes: This unit consists of active and stabilized dunes consisting of loose to medium dense poorly graded sand. This unit varied in thickness from a few feet to more than 30 feet.

Unit 2 – Flood Deposits: This unit generally underlies the dune sands and consists of dense to very dense sands and gravels interlayered with fine grained soils. Boulders were encountered in this unit.

Unit 3 – Granite: This unit consists of completely weathered, very weak rock to slightly weathered, strong rock. Where encountered, the rock became less weathered and stronger with depth.

2.3.1. US 395 Northbound Overcrossing at Fairview Road

Soils in the vicinity of the US 395 Northbound Overcrossing at Fairview Road consists of 10 to 15 feet of loose to medium dense sand (Dunes) overlying granite. The granite is completely weathered at the contact with the sand, and becomes less weathered with depth.

A plan view of the bridge, including the location of the exploratory borings, is shown on Figure 2 in Appendix A. A bridge profile and geologic cross-section is shown on Figure 3 in Appendix A.

2.3.2. US 395 Northbound Overcrossing at Market Street

Soils in the vicinity of the US 395 Northbound Overcrossing with Market Street consists of 25 to 35 feet of loose to medium dense sand (Dunes) overlying dense to very dense sands and gravels (Flood Deposits). Completely weathered granite was encountered at a depth of 90 feet in boring MRK-3-04.

A plan view of the bridge, including the location of the exploratory borings, is shown on Figure 4 in Appendix A. A bridge profile and geologic cross-section is shown on Figure 5 in Appendix A.

2.3.3. US 395 Northbound Overcrossing at Parksmith Drive/BNSF

Soils in the vicinity of the US 395 Northbound Overcrossing at Parksmith Drive/BNSF consist of 5 to 10 feet of loose to medium dense sand (Dunes) overlying dense to very dense sand and gravels (Flood Deposits). Granite boulders were encountered within the Flood Deposits at various depths.

A plan view of the bridge, including the location of the exploratory borings, is shown on Figure 6 in Appendix A. A bridge profile and geologic cross-section is shown on Figure 7 in Appendix A.

2.3.4. US 395 Undercrossing at Perry Street

Soils in the vicinity of the US 395 Undercrossing at Perry Street consists of 5 to 15 feet of loose to medium dense sand (Dunes) overlying dense to very dense sands and gravels (Flood Deposits).

A plan view of the bridge, including the location of the exploratory borings, is shown on Figure 8 in Appendix A. A bridge profile and geologic cross-section is shown on Figure 9 in Appendix A.

2.4. GROUNDWATER

Piezometers installed in several of the exploratory borings indicate there is no groundwater table within the soil depths investigated. Several borings show a groundwater table recorded at the time of drilling. We believe this to be drilling fluid trapped in the soil formation and not representative of an actual groundwater table.

3. SEISMOLOGICAL CONSIDERATIONS

3.1. DESIGN EARTHQUAKE PARAMETERS

For seismic design, a peak bedrock acceleration coefficient of 0.06 is recommended based on the June 1996 US Geological Survey National Seismic Hazards Mapping project, as cited in the *Bridge Design Manual*. The recommended acceleration coefficient is based on expected ground motion at the project site that has a 10 percent probability of exceedence in a 50-year period (475-year return period). Design response spectra presented in the AASHTO guide specifications for seismic design of highway bridges are considered appropriate for seismic design of these bridges. A type II Soil Profile response spectrum, with a Site Coefficient of 1.2 is recommended for seismic design.

3.2. SEISMIC HAZARDS

Soil liquefaction is a phenomenon whereby saturated soil deposits temporarily lose strength and behave as a viscous fluid in response to cyclic loading. Soil types considered at the highest risk of liquefaction during a seismic event are loose to medium dense, sandy soils. While other studies have indicated these soils do exist within the project corridor limits, they were not encountered at the structures addressed in this report. Consequently, we do not anticipate any ground settlement or lateral spreading to occur following a design seismic event.

4. BRIDGE FOUNDATION RECOMMENDATIONS

4.1. GENERAL

We understand the bridges associated with this project will be designed using Load and Resistance Factored Design (LRFD) methodology. Based on the soil conditions observed

during our field exploration program, we recommend spread footings be used for all of the bridge foundations. Recommendations for spread footings include nominal resistance for service, strength, and extreme limit states. Lateral earth pressure coefficients and soil parameters for use in designing abutment walls and curtain walls are also provided.

4.2. SPREAD FOOTINGS

Appendix E contains tables of bearing capacity versus footing width for service, strength, and extreme limit states for each bridge. In order to provide adequate service limit state bearing capacity and/or an adequate factor of safety for global stability, a maximum footing elevation is specified for some of the bridge piers. Where unspecified, the footing elevations should be determined by the structural engineer in accordance with Figure 9.5.1-1 of the *Bridge Design Manual*.

Equivalent spring constants for the spread footing foundations should be determined by the method outlined in Section 7.2.4 of FHWA Report No. IP-87-6 titled: *Seismic Design and Retrofit for Highway Bridges*. The shear modulus and Poisson's ratio of the foundation soil must be estimated to calculate the equivalent spring constants using this method. Based on the results of our analysis, we have developed a range of shear modulus values for the soil units under these subject spread footings. The most critical spring constant depends on the rigidity of the superstructure. This is determined by the structural engineer. Ranges of shear modulus values are presented in Appendix E, so as to determine which is more critical, a weak or stiff spring.

We recommend the following resistance factors be used when evaluating the different limit states.

Spread Footing Resistance Factors

Limit State	Resistance Factor ϕ		
	Shear Resistance to Sliding	Passive Pressure Resistance to Sliding	Bearing
Strength	0.80	0.50	0.45
Service	N/A	N/A	1.00
Extreme	0.90	0.90	0.90

4.2.1. Service Limit State Settlement

Appendix contains tables for bearing capacity at the Service Limit State. These bearing capacities are settlement-limited values; the amount of settlement is provided in the tables.

Service Limit State settlements at the Fairview Road and Perry Street bridges are based on the customary one inch of settlement. This settlement represents a total settlement at the footing widths and bearing pressures provided in the tables. Differential settlements, both longitudinal and transverse to the structure, are anticipated to be less than ¾ inch.

Service Limit State Capacities for the Market Street bridge have been based on two inches of settlement. Limiting the allowable settlement to one inch would necessitate the use of deep foundations at this bridge. Based on our meetings with the WSDOT Bridge and Structures Office, we understand the proposed structure can tolerate the estimated settlement, and there will be a significant cost savings using spread footings over deep foundations. Differential settlements between the bridge piers are anticipated to be less than 1½ inches. Differential settlements transverse to the piers (along the centerline of bearing) are anticipated to be less than ½ inch over the length of the footings.

Service Limit State Capacities for the Parksmith Drive/BNSF bridge have been based on 1½ inches of settlement. Typically, Service Limit State settlements are limited to less than one inch for multi-span bridges. However, due to the nature of the bridge construction sequence, we understand this bridge will remain settlement tolerant until a final concrete closure pour that will occur after the bridge deck has been poured. We recommend the construction sequence be included in the documents. Differential settlements between the piers are anticipated to be less than 1¼ inches. Differential settlements transverse to the piers (along the centerline of bearing) are anticipated to be less than ½ inch over the length of the footings.

Where indicated in Appendix E, we recommend the near surface soils be excavated and replaced with Gravel Borrow per Standard Specification 9-03.14(1) compacted in accordance with Standard Specification 2-03.3(14) C, Method C. A detail of the excavation and replacement limits is provided on Figure 10 in Appendix A. Elevation limits for the excavation and replacement are provided in Appendix E. Where footing elevations will be above existing ground elevations, we recommend the fill under the footing be placed in accordance with Figure 10.

4.2.2. Settlement Monitoring

We recommend the settlement of the spread footings be monitored during construction. Careful monitoring of footing settlement may allow us to refine our Service Limit State design recommendations for future structures within the US 395 North Spokane Corridor. Site-specific settlement behavior may result in smaller footings and decreased construction costs.

A survey monument should be placed on the toe of each spread footing immediately after the footing is poured (before construction of the abutment wall). The elevation of the monument should be measured to within 0.01 feet at the completion of each major portion of the bridge construction (footing, abutment wall, girders, bridge deck, and backfill of abutment). A riser pipe may be necessary if the footing is backfilled prior to completion of bridge construction. As several of these bridges will have large approach embankments, we recommend a benchmark be selected that is well away from any construction activity. We are available to assist is developing a special provision for inclusion in the contract plans for this work.

4.3. ABUTMENT WALLS

Abutment walls should be designed using the lateral earth pressure coefficients and soil parameters provided in Appendix E, in conjunction with the design methodology presented in the WSDOT *Bridge Design Manual*. We recommend disregarding the upper 2 feet of soil against the front face of the abutment wall when determining passive soil resistance unless pavement is located at the toe. Per the *Bridge Design Manual*, the lateral earth pressure due to traffic surcharge loading can be calculated using a uniformly distributed load at the ground surface of 250 psf multiplied by K_a.

4.4. BRIDGE APPROACH SLABS

The Design Manual Section 1120.03(6) requires all bridges to have approach slabs unless approval for their deletion has been given. We anticipate there will be some differential settlement between the bridge abutments and the approach embankments. We recommend that approach slabs be used at all of the bridges discussed in this report.

5. CONSTRUCTION CONSIDERATIONS

Bedrock will likely be encountered during the excavation for the spread footings at the US 395 Northbound Overcrossing at Fairview Road. Within the limits of the anticipated excavation, the rock will be completely weathered and very weak. We believe the excavation can be achieved with conventional earth moving equipment. Drilling and blasting will likely not be necessary.

APPENDIX A - FIGURES

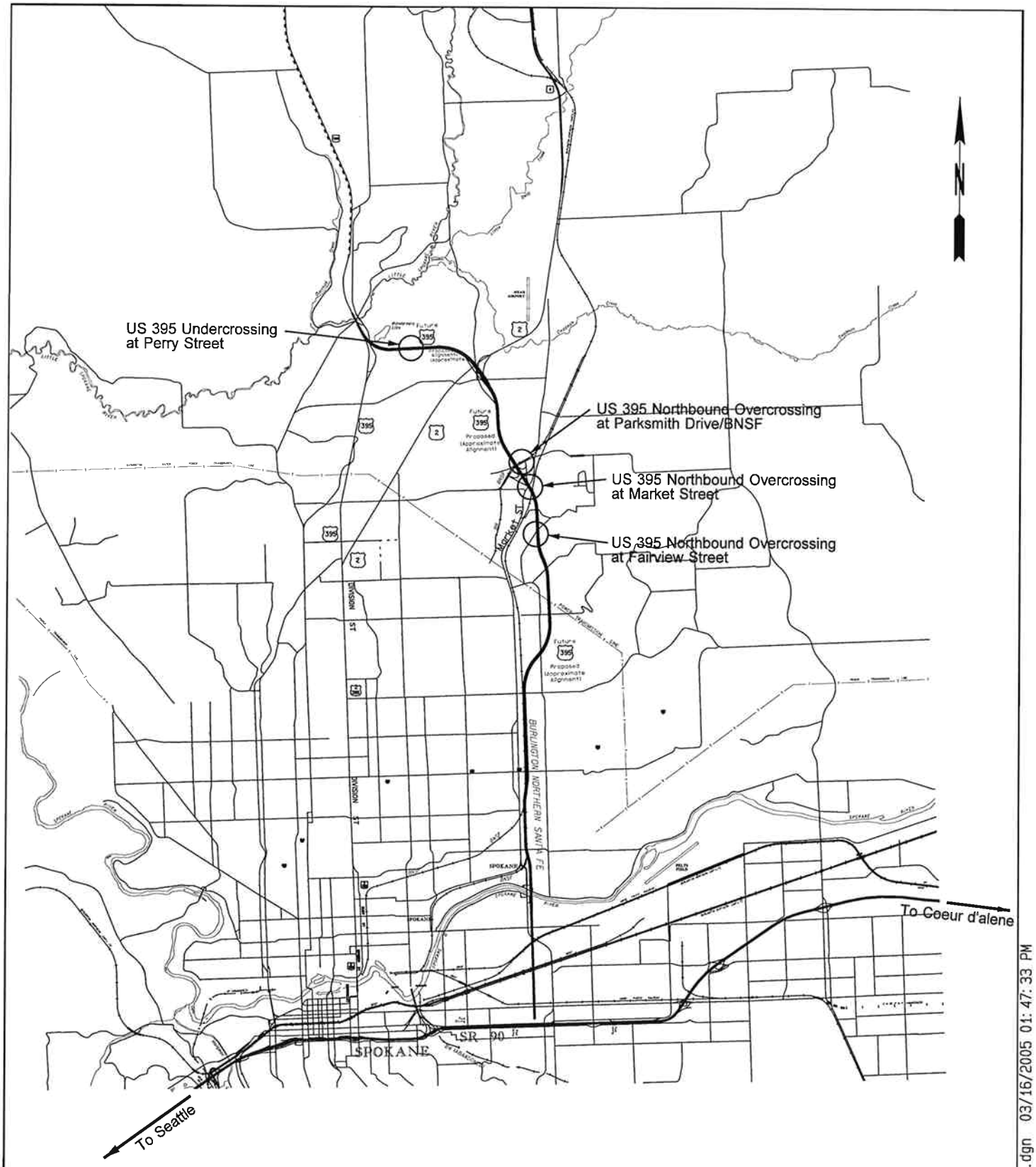

FIGURE 1: SITE VICINITY MAP

JOB XL-2201 S.R. 395 C.S. 3208 LAYOUT

SR 395 North Spokane Corridor
Francis Avenue to US-2 Structures

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T. E. BAKER MATERIALS ENGINEER

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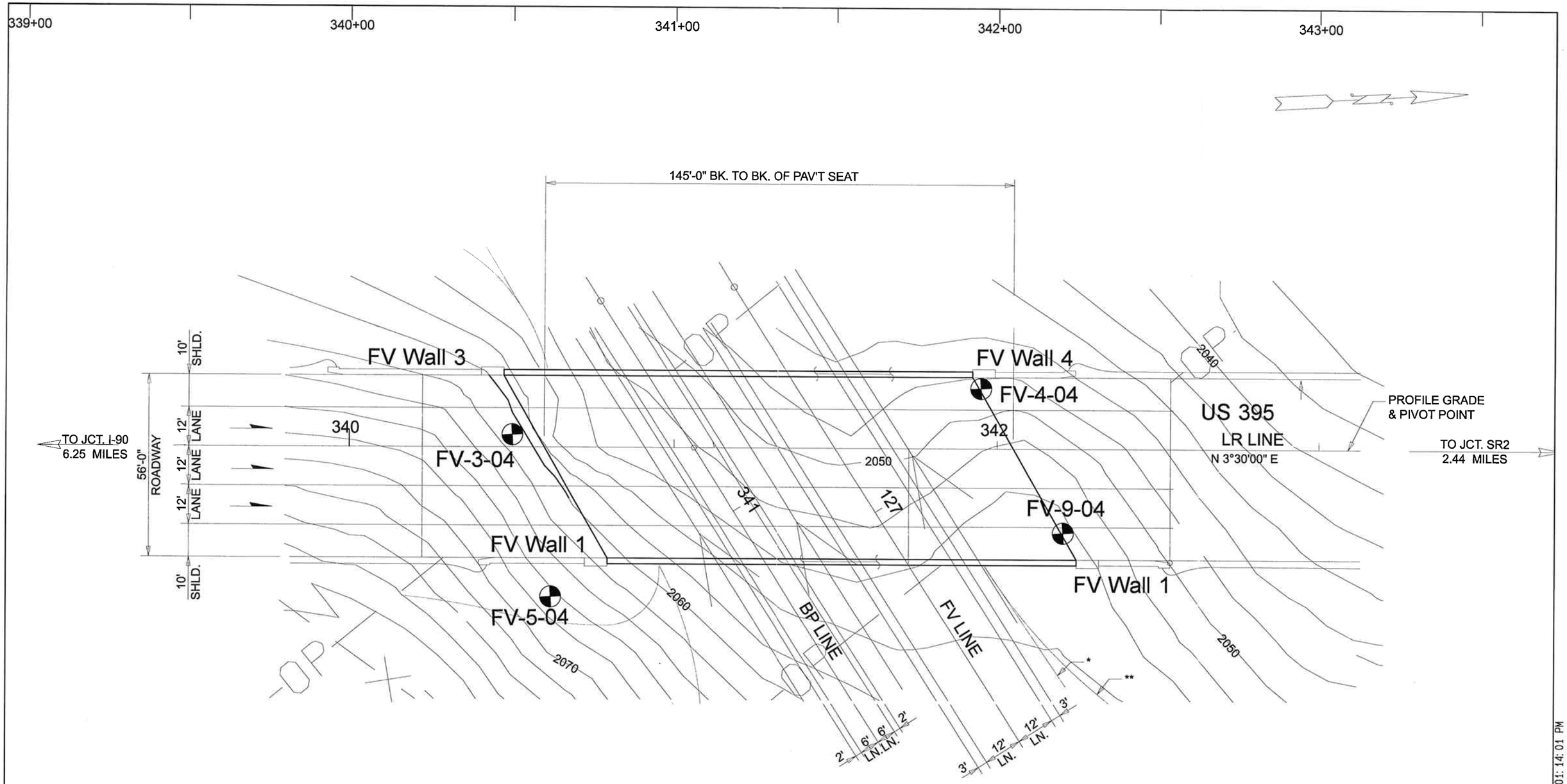

Figure 2

Site and Exploration Plan

US-395 Northbound Overcrossing at Fairview Road

JOB XL-2201 S.R. 395 C.S. _____ LAYOUT _____

SR 395, North Spokane Corridor

Francis Avenue to US-2 Structures

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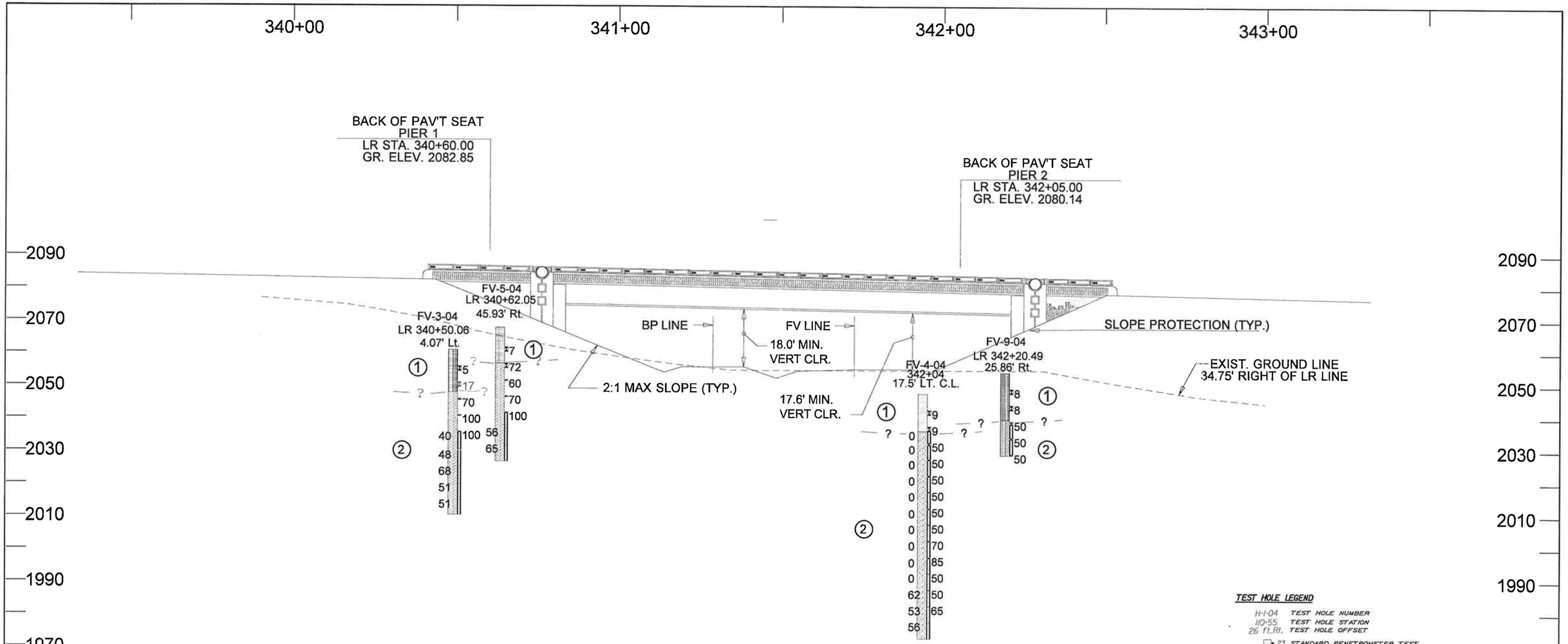

① Loose to medium dense, poorly graded SAND (dunes)

② GRANITE

Figure 3

Generalized Geologic Profile
US-395 Northbound Overcrossing at Fairview Road

JOB XL-2201 S.R. 395 C.S. _____ LAYOUT _____

SR 395, North Spokane Corridor
Francis Avenue to US-2 Structures

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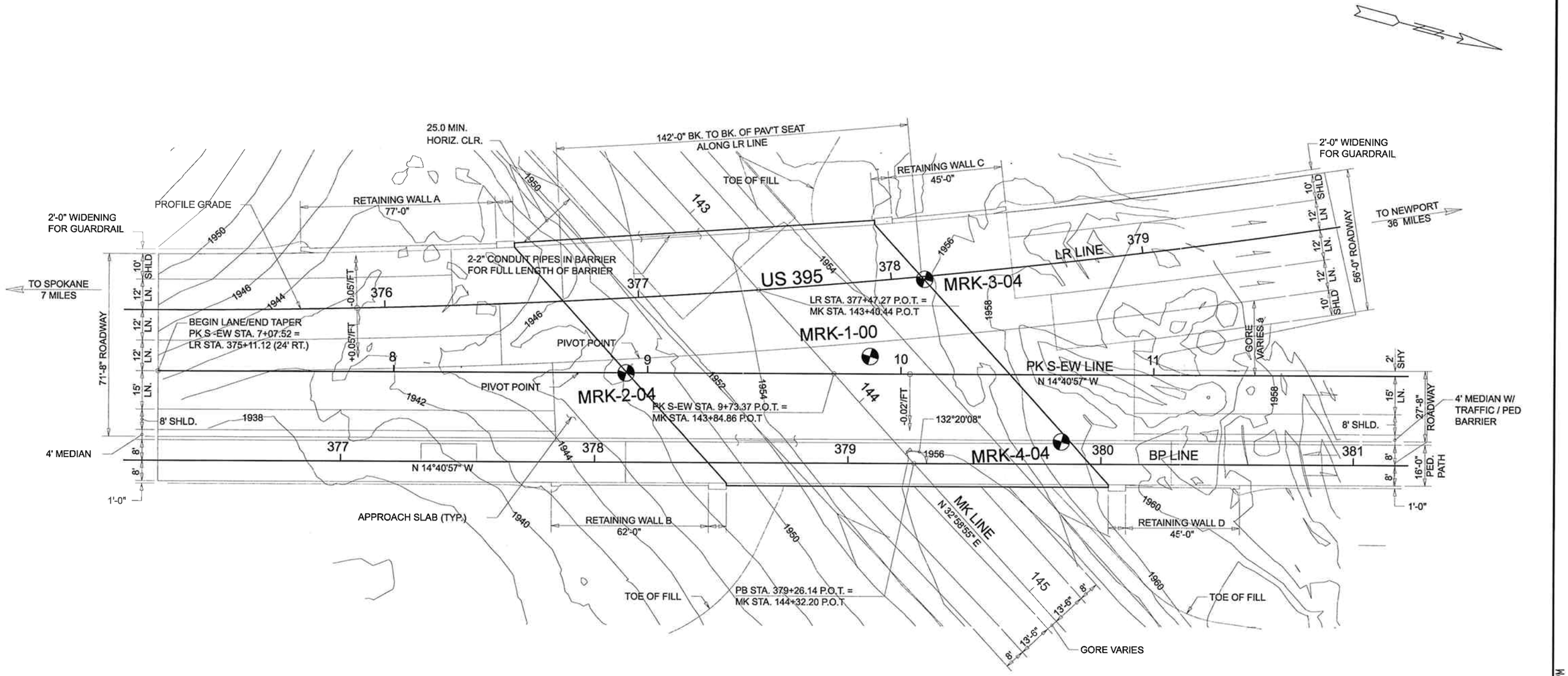

Figure 4

Site and Exploration Plan

US-395 Northbound Overcrossing at Market Street

JOB XL-2201 S.R. 395 C.S. _____

SR 395, North Spokane Corridor
Francis Avenue to US-2 Structures

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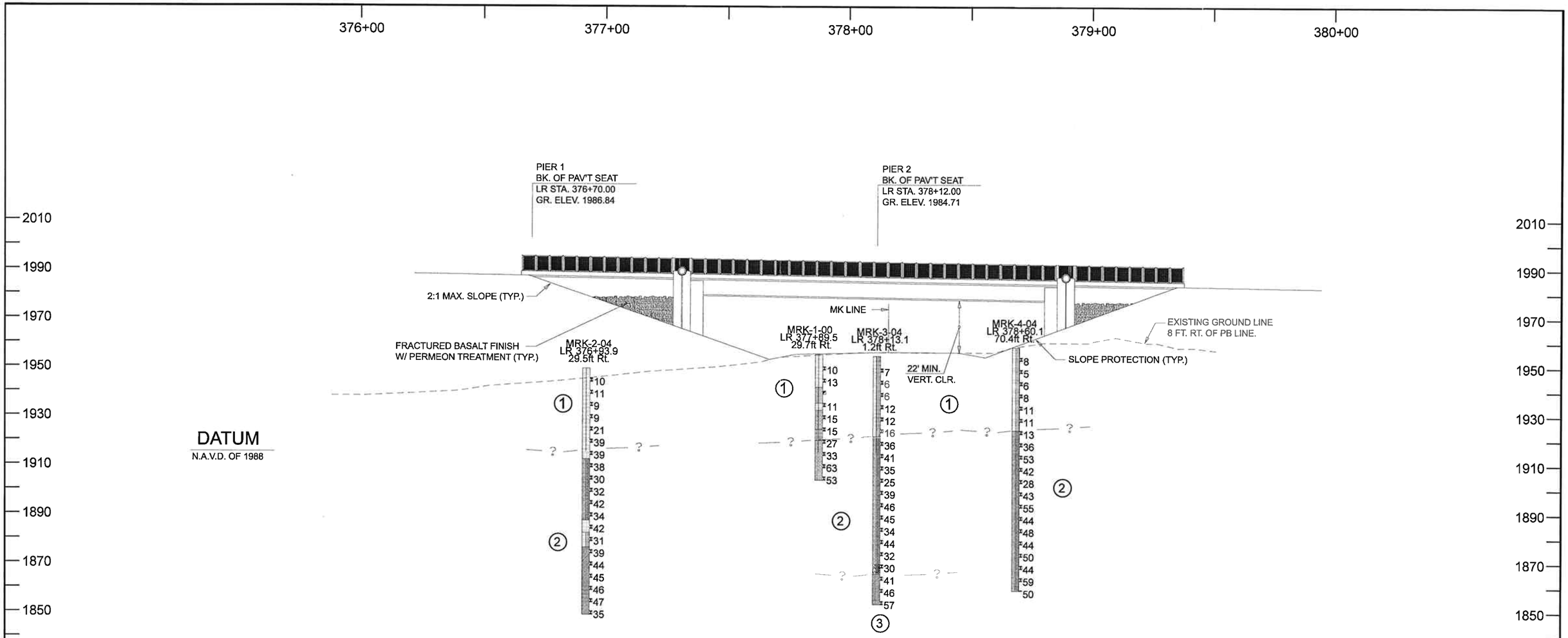

① Loose to medium dense, poorly graded SAND (Dunes)

② Dense to very dense, silty SAND and GRAVEL (Flood Deposits)

③ GRANITE

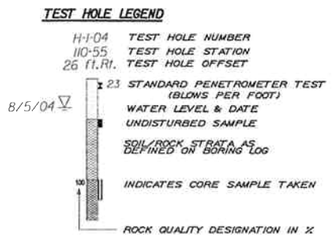

Figure 5

Generalized Geologic Profile
US-395 Northbound Overcrossing at Market Street

JOB XL-2201 S.R. 395 C.S. _____

SR 395, North Spokane Corridor
Francis Avenue to US-2 Structures

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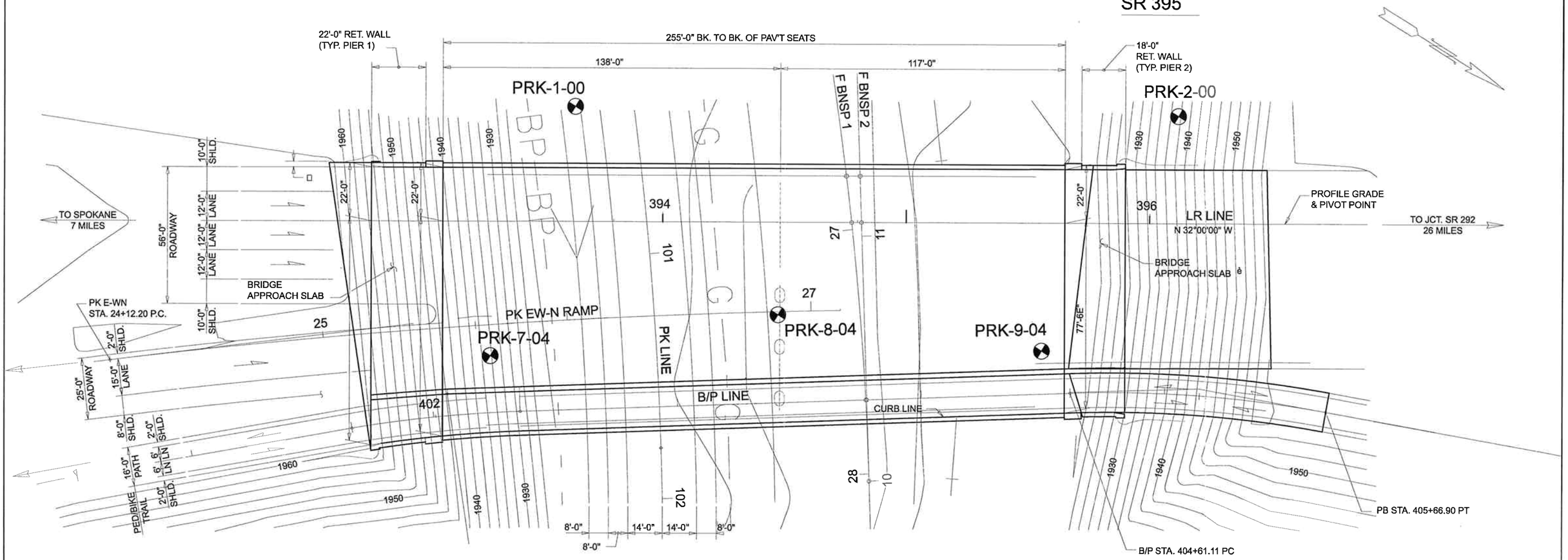

Figure 6

Site and Exploration Plan

US-395 Northbound Overcrossing at Parksmith Drive/BNSF

JOB XL-2201 S.R. 395 C.S. _____ LAYOUT _____

SR 395, North Spokane Corridor
Francis Avenue to US-2 Structures

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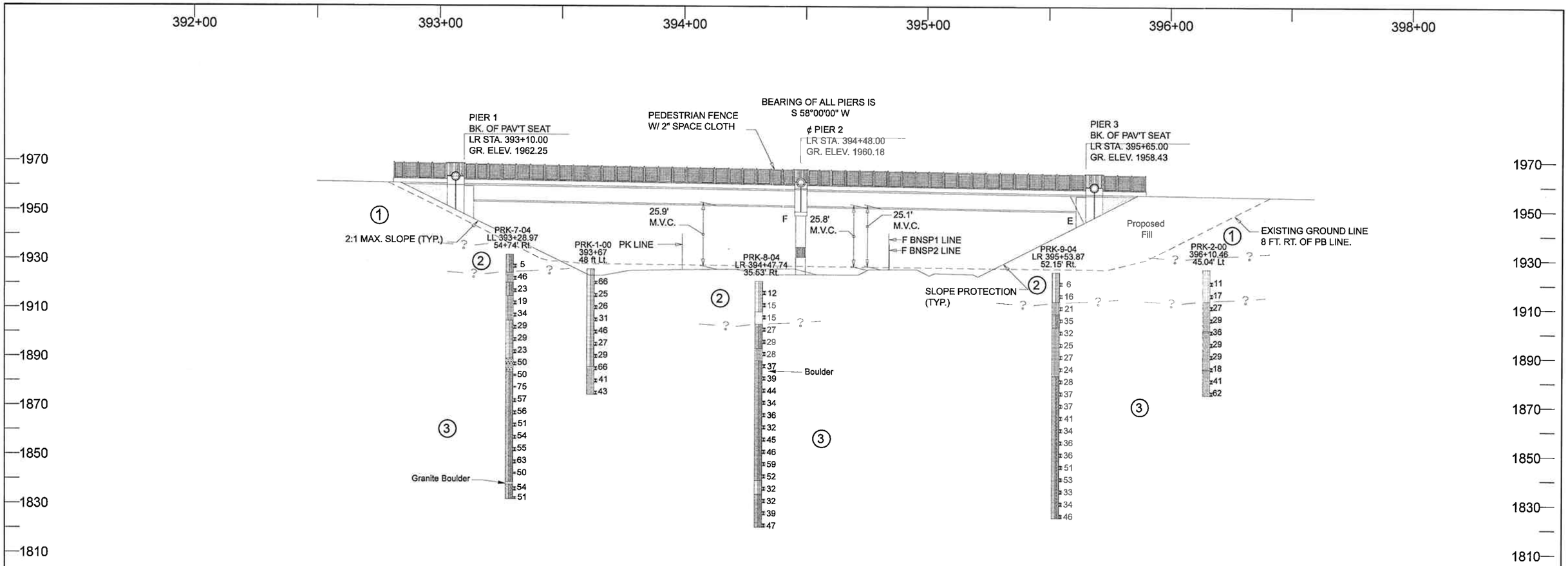

① Existing FILL, poorly graded SAND

② Loose to medium dense, poorly graded SAND (Dunes)

③ Dense to very dense, well graded SAND, silty SAND, and Well graded GRAVEL (Flood Deposits)

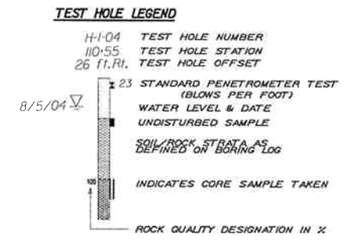

Figure 7

Generalized Geologic Profile
US-395 Northbound Overcrossing at Parksmith Drive/BNSF

JOB XL-2201 S.R. 395 C.S. _____ LAYOUT _____

SR 395, North Spokane Corridor
Francis Avenue to US-2 Structures

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US 395

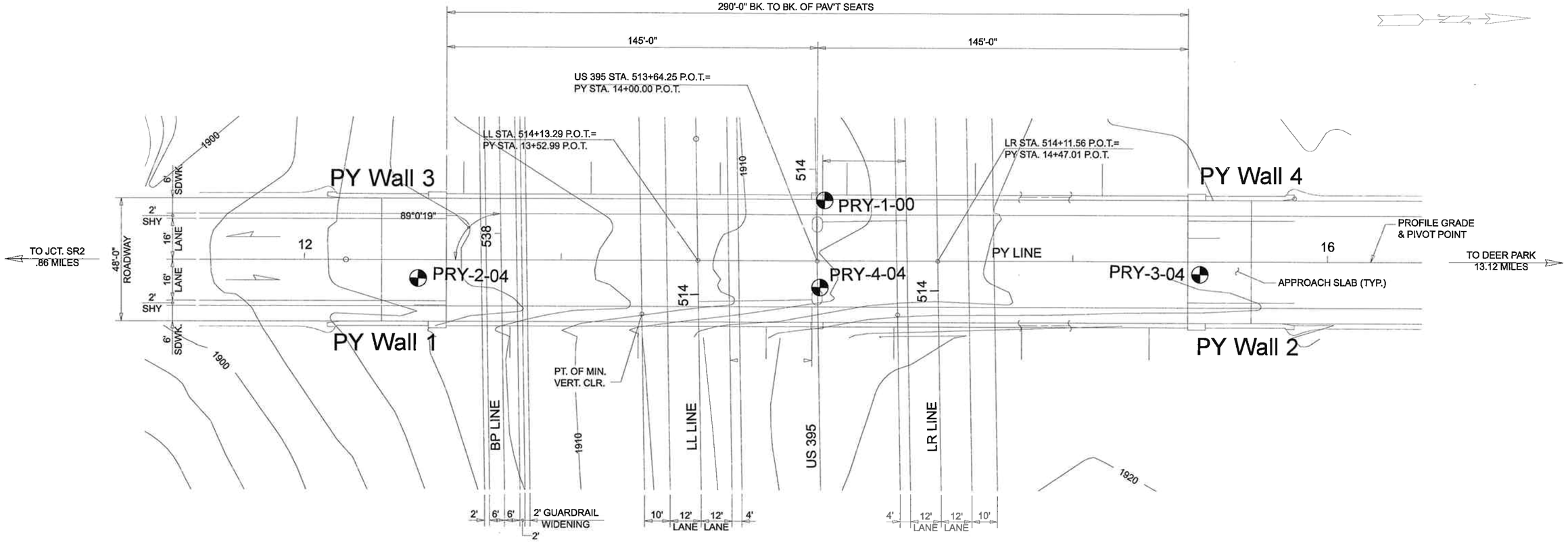

Figure 8

Site and Exploration Plan
US-395 Undercrossing at Perry Street

JOB XL-2201 S.R. 395 C.S. _____ LAYOUT _____

SR 395, North Spokane Corridor
Francis Avenue to US-2 Structures

WASHINGTON STATE TRANSPORTATION COMMISSION
DEPARTMENT OF TRANSPORTATION
MATERIALS BRANCH
T. E. BAKER MATERIALS ENGINEER

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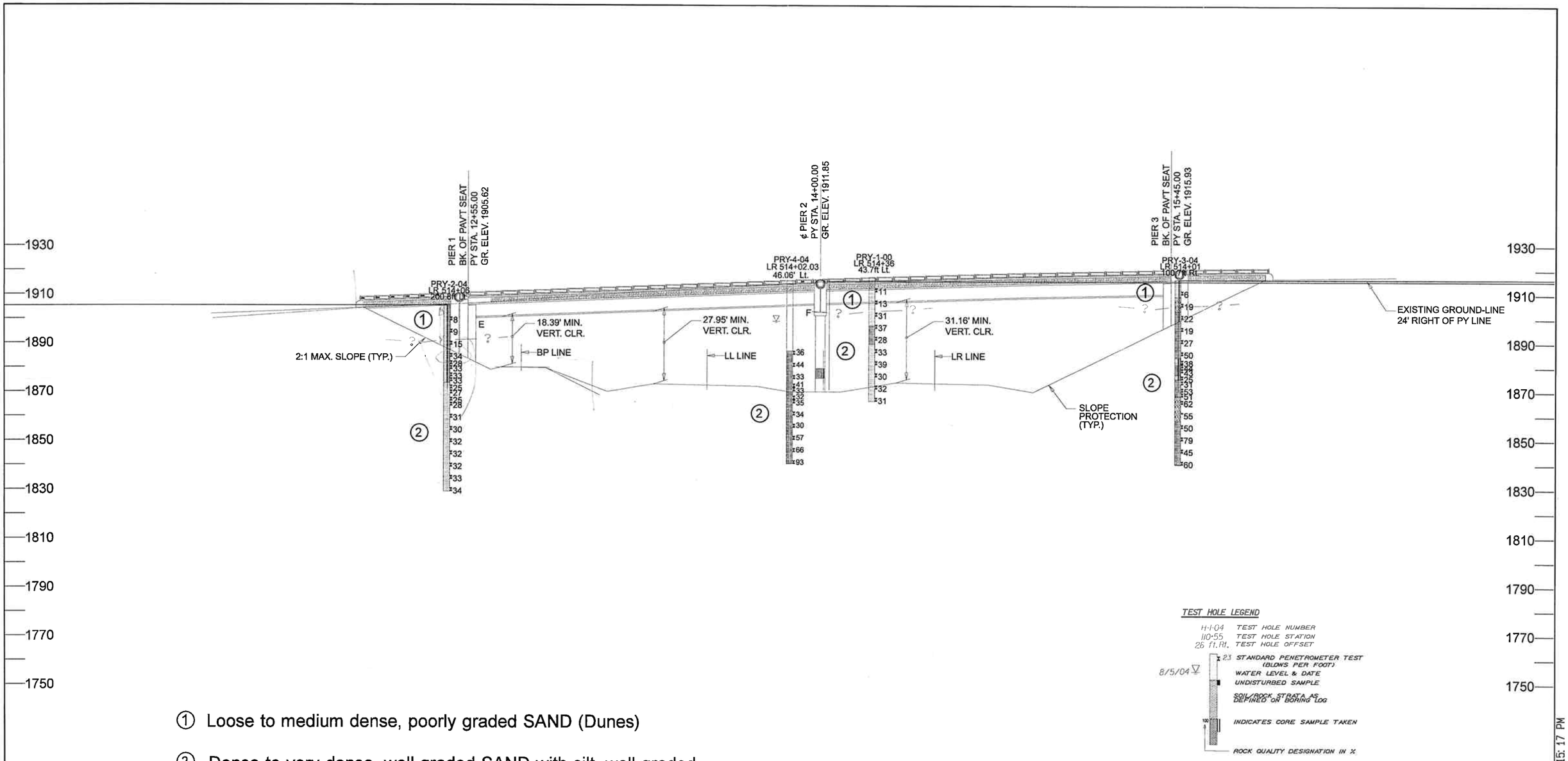

① Loose to medium dense, poorly graded SAND (Dunes)

② Dense to very dense, well graded SAND with silt, well graded SAND with gravel, and well graded GRAVEL with SAND (Flood Deposits)

Figure 9

Site and Exploration Plan
US-395 Undercrossing at Perry Street

JOB XL-2201 S.R. 395 C.S. _____ LAYOUT _____

SR 395, North Spokane Corridor
Francis Avenue to US-2 Structures

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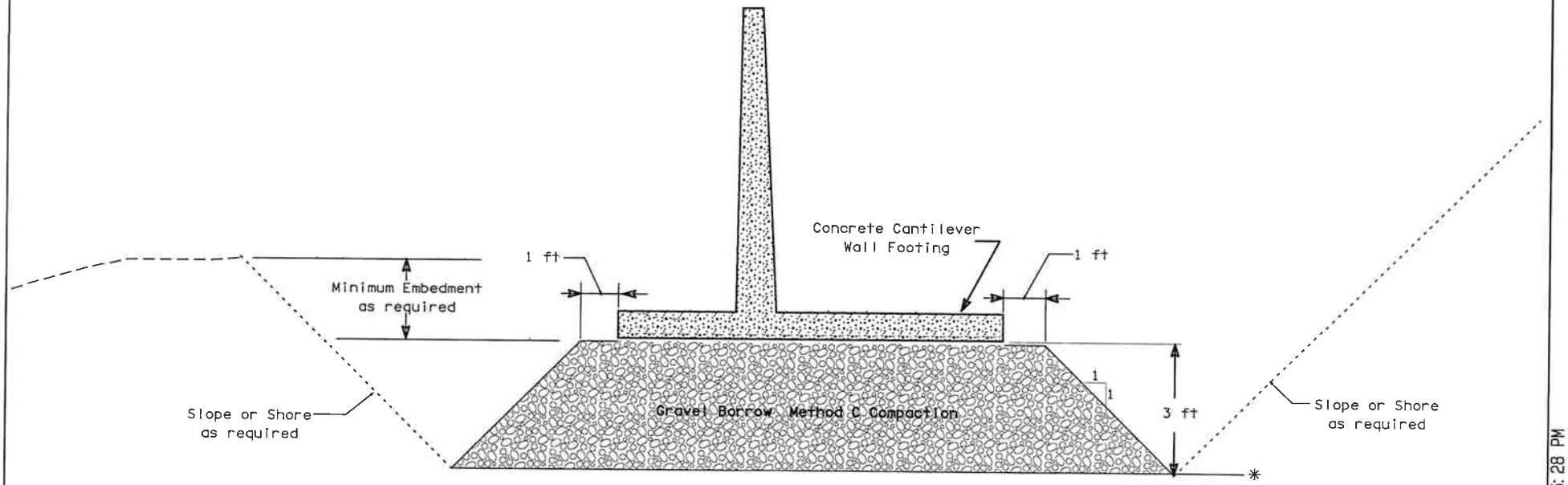

* (Varies, See Report)
Elev 2045'-2055' Pier1 US 395 NB O'Xing at Fairview Road
Elev 1920 Pier 3 US 395 NB O'Xing at Parksmith Drive/BNSF

FIGURE 10: Overexcavation Detail

JOB XL-2201 S.R. 395 C.S. _____ LAYOUT _____

SR 395, North Spokane Corridor
Francis Avenue to US-2 Structures

WASHINGTON STATE
TRANSPORTATION COMMISSION
DEPARTMENT OF TRANSPORTATION
MATERIALS BRANCH
T. E. BAKER MATERIALS ENGINEER

DATE 11/2004
SCALE NTS VERT. HORIZ.
SHEET ___ OF ___
DRAWN BY DWG

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APPENDIX B - FIELD EXPLORATIONS

FIELD EXPLORATIONS

WSDOT's field exploration program for the Francis Avenue to US 2, Structures project consisted of drilling 13 exploratory borings.

Geotechnical drilling was performed using a CME 850 track-mounted drilling rig and a CME-45 skid-mounted drill rig. Test holes were advanced to depths up to 100 feet below the ground surface principally using mud rotary drilling methods. At each location, soil samples were obtained using a SPT (Standard Penetration Test) sampler, in general accordance with ASTM D-1586. SPTs are obtained by driving a 2-inch outside diameter split-spoon sampler 18-inches into the soil with a 140-pound hammer. The number of blows required to achieve each 6 inches of penetration is recorded and the soil's SPT resistance, or N-value, is calculated as the number of blows required to achieve the final 12 inches of penetration. Each drill rig is equipped with an automatic trip hammer to drive the split-spoon sampler. The automatic hammers on these two drill rigs are rated at approximately 80 percent efficiency, as compared to approximately 60 percent for manual hammers.

Select soil samples were then submitted to the E&EP Materials Laboratory for laboratory testing.

Washington State Department of Transportation

Test Boring Legend

Sampler Symbols

	Standard Penetration Test
X	Oversized Penetration Test (Dames & Moore, California)
	Shelby Tube
P	Piston Sample
	Washington Undisturbed
	Vane Shear Test
	Core
	Becker Hammer
B	Bag Sample

Well Symbols

	Cement Surface Seal
	Piezometer Pipe in Granular Bentonite Seal
	Piezometer Pipe in Sand
	Well Screen in Sand
	Granular Bentonite Bottom Seal
	Inclinometer Casing in Concrete Bentonite Grout

Laboratory Testing Codes

UU	Unconsolidated Undrained Triaxial
CU	Consolidated Undrained Triaxial
CD	Consolidated Drained Triaxial
UC	Unconfined Compression Test
DS	Direct Shear Test
CN	Consolidation Test
GS	Grain Size Distribution
MC	Moisture Content
SG	Specific Gravity
OR	Organic Content
DN	Density
AL	Atterberg Limits
PT	Point Load Compressive Test
SL	Slake Test
DG	Degradation
LA	LA Abrasion

Soil Density Modifiers

Gravel, Sand & Non-plastic Silt		Elastic Silts and Clay	
SPT Blows/ft	Density	SPT Blows/ft	Consistency
0-4	Very Loose	0-1	Very Soft
5-10	Loose	2-4	Soft
11-24	Medium Dense	5-8	Medium Stiff
25-50	Dense	9-15	Stiff
>50	Very Dense	16-30	Very Stiff
		31-60	Hard
		>60	Very Hard

Angularity of Gravel & Cobbles

Angular	Coarse particles have sharp edges and relatively plane sides with unpolished surfaces.
Subangular	Coarse grained particles are similar to angular but have rounded edges.
Subrounded	Coarse grained particles have nearly plane sides but have well rounded corners and edges.
Rounded	Coarse grained particles have smoothly curved sides and no edges.

Soil Moisture Modifiers

Dry	Absence of moisture; dusty, dry to touch
Moist	Damp but no visible water
Wet	Visible free water

Soil Structure

Stratified	Alternating layers of varying material or color at least 6mm thick; note thickness and inclination.
Laminated	Alternating layers of varying material or color less than 6mm thick; note thickness and inclination.
Fissured	Breaks along definite planes of fracture with little resistance to fracturing.
Slickensided	Fracture planes appear polished or glossy, somtimes striated.
Blocky	Cohesive soil that can be broken down into smaller angular lumps which resist further breakdown.
Disrupted	Soil structure is broken and mixed. Infers that material has moved substantially - landslide debris.
Homogeneous	Same color and appearance throughout.

HCL Reaction

No HCL Reaction	No visible reaction.
Weak HCL Reaction	Some reaction with bubbles forming slowly.
Strong HCL Reaction	Violent reaction with bubbles forming imediately.

Degree of Vesicularity of Pyroclastic Rocks

Slightly Vesicular	5 to 10 percent of total
Moderately Vesicular	10 to 25 percent of total
Highly Vesicular	25 to 50 percent of total
Scoriaceous	Greater than 50 percent of total

Washington State Department of Transportation

Test Boring Legend

Grain Size

Fine Grained	< 1mm	Few crystal boundaries/grains are distinguishable in the field or with hand lens.
Medium Grained	1mm to 5mm	Most crystal boundaries/grains are distinguishable with the aid of a hand lens.
Coarse Grained	> 5mm	Most crystal boundaries/grains are distinguishable with the naked eye.

Weathered State

Term	Description	Grade
Fresh	No visible sign of rock material weathering; perhaps slight discoloration in major discontinuity surfaces.	I
Slightly Weathered	Discoloration indicates weathering of rock material and discontinuity surfaces. All the rock material may be discolored by weathering and may be somewhat weaker externally than its fresh condition.	II
Moderately Weathered	Less than half of the rock material is decomposed and/or disintegrated to soil. Fresh or discolored rock is present either as a continuous framework or as core stones.	III
Highly Weathered	More than half of the rock material is decomposed and/or disintegrated to soil. Fresh or discolored rock is present either as discontinuous framework or as core stone.	IV
Completely Weathered	All rock material is decomposed and/or disintegrated to soil. The original mass structure is still largely intact.	V
Residual Soil	All rock material is converted to soil. The mass structure and material fabric is destroyed. There is a large change in volume, but the soil has not been significantly transported.	VI

Relative Rock Strength

Grade	Description	Field Identification	Uniaxial Compressive Strength approx
R1	Very Weak	Specimen crumbles under sharp blow from point of geological hammer, and can be cut with a pocket knife.	1 to 25 MPa
R2	Moderately Weak	Shallow cuts or scrapes can be made in a specimen with a pocket knife. Geological hammer point indents deeply with firm blow.	25 to 50 MPa
R3	Moderately Strong	Specimen cannot be scraped or cut with a pocket knife, shallow indentation can be made under firm blows from a hammer.	50 to 100 MPa
R4	Strong	Specimen breaks with one firm blow from the hammer end of a geological hammer.	100 to 200 MPa
R5	Very Strong	Specimen requires many blows of a geological hammer to break intact sample.	Greater than 200 MPa

Discontinuities

Spacing	
Very Widely	Greater than 3 m
Widely	1 m to 3 m
Moderately	0.3 m to 1 m
Closely	50 mm to 300 mm
Very Closely	Less than 50 mm

RQD (%)

$$\frac{100(\text{length of core in pieces} > 100\text{mm})}{\text{Length of core run}}$$

Condition	
Excellent	Very rough surfaces, no separation, hard discontinuity wall
Good	Slightly rough surfaces, separation less than 1 mm, hard discontinuity wall.
Fair	Slightly rough surfaces, separation greater than 1 mm, soft discontinuity wall.
Poor	Slickensided surfaces, or soft gouge less than 5 mm thick, or open discontinuities 1 to 5 mm.
Very Poor	Soft gouge greater than 5 mm thick, or open discontinuities greater than 5 mm.

Fracture Frequency (FF) is the average number of fractures per 300 mm of core.
Does not include mechanical breaks caused by drilling or handling.

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S 23721

Job No. XL-2201 SR 395 Elevation 2062.0 ft (628.5 m)

HOLE No. FV-3-04

Sheet 1 of 3

Project NSLAC - Perry, Market and Fairview Structures

Driller Kerry Cooper Lic# 2552

Site Address Vicinity of Fairview Road and Prososed SR 395

Inspector Cleo Andrews

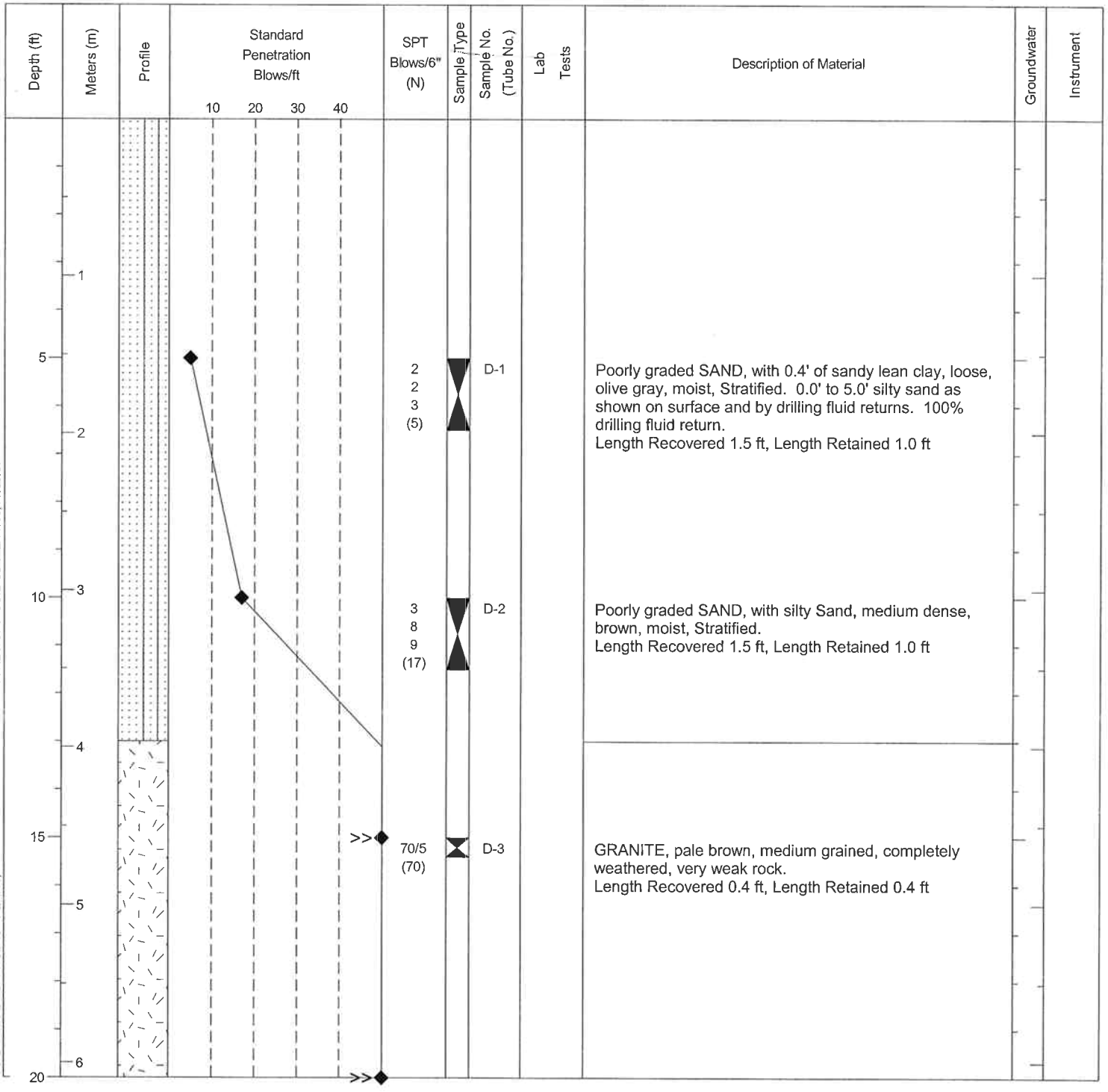
Start September 22, 2004 Completion September 23, 2004 Well ID#

Equipment CME 55 w/ autohammer

Station LR 340+50.06 Offset 4.07' Lt. Casing HQ 3" ID x 80.0' Method Wet Rotary

Northing 618259.786 Easting 2823018.831 Latitude Longitude

County Spokane Subsection SE 1/4 of the SW 1/4 Section 15 Range 43 EWM Township 26



SOIL ALL XL-2201 NSLAC - PERRY, MARKET AND FAIRVIEW STRUCTURES.GPJ SOIL.GDT 2/11/05 11:30:37

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S 23721

Job No. XL-2201 SR 395 Elevation 2062.0 ft (628.5 m)

HOLE No. FV-3-04

Sheet 2 of 3

Project NSLAC - Perry, Market and Fairview Structures

Driller Kerry Cooper Lic# 2552

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
			>>	100/4 (100)		D-4		GRANITE, pale brown, medium grained, completely weathered, very weak rock. Length Recovered 0.3 ft, Length Retained 0.3 ft		
25	7		>>	100/4 (100) RQD 40 FF 6		D-5 C-6		GRANITE, light yellowish brown, medium grained, highly weathered, very weak rock. Discontinuities are very widely spaced and in very poor condition, (Changed to more in tact rock at 23.3). Length Recovered 0.3 ft, Length Retained 0.3 ft GRANITE, moderately fractured, light greenish gray, medium grained, slightly weathered, very strong rock. Discontinuities are moderately spaced and in fair condition, Percent Recovered 80.0%		
30	8 9			RQD 48 FF 7		C-7		GRANITE, moderately fractured, light greenish gray, medium grained, slightly weathered, very strong rock. Discontinuities are moderately spaced and in fair condition, Percent Recovered 100.0%		
35	10 11			RQD 68 FF 6		C-8		GRANITE, moderately fractured, light greenish gray, medium grained, slightly weathered, very strong rock. Discontinuities are moderately spaced and in fair condition, 100% drilling fluid loss starting at 43.0', Percent Recovered 100.0%		
40	12 13			RQD 51 FF 6		C-9		GRANITE, light greenish gray, medium grained, slightly weathered, very strong rock. Discontinuities are moderately spaced and in fair condition, Percent Recovered 100.0%		
45										

SOIL ALL XL-2201 NSLAC - PERRY, MARKET AND FAIRVIEW STRUCTURES.GPJ SOIL.GDT 2/11/05,11:30:37

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S 23721

Job No. XL-2201 SR 395 Elevation 2062.0 ft (628.5 m)

HOLE No. FV-3-04

Sheet 3 of 3

Project NSLAC - Perry, Market and Fairview Structures

Driller Kerry Cooper Lic# 2552

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
50	14 15			RQD 51 FF 5		C-10		GRANITE, light greenish gray, medium grained, slightly weathered, very strong rock. Discontinuities are moderately spaced and in fair condition, Percent Recovered 100.0%		
55 60 65 70	16 17 18 19 20 21							End of test hole boring at 50.5 ft below ground elevation. This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications and laboratory test data. (Test hole dry). Ended and abandoned test boring at 50.5' below ground elevation. 9/23/04.,		

SOIL ALL XL-2201 NSLAC - PERRY, MARKET AND FAIRVIEW STRUCTURES.GPJ SOIL.GDT 2/11/05.11:30:37

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S 23721

Job No. XL-2201 SR 395 Elevation 2048.6 ft (624.4 m)

HOLE No. FV-4-04

Sheet 1 of 4

Project NSLAC - Perry, Market and Fairview Structures

Driller Kerry Cooper Lic# 2552

Site Address Vicinity of Fairview Road and Proposed SR-395

Inspector Cleo Andrews

Start September 24, 2004 Completion September 28, 2004 Well ID#

Equipment CME 45 w/ autohammer

Station LR 341+95.15 Offset 18.54' Lt. Casing HQ 3" ID x 80.0'

Method Wet Rotary

Northing 618405.482 Easting 2823013.244 Latitude

Longitude

County Spokane Subsection SE 1/4 of the SW 1/4 Section 15 Range 43 EWM Township 26

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
5	1			2 4 5 (9)		D-1	GS MC	SP, M.C. = 22% Poorly graded SAND, loose, brown, moist, Homogeneous. 0.0' to 5.0' Poorly graded Sand as shown in wash return. 100% drilling fluid return. Length Recovered 1.5 ft, Length Retained 1.0 ft		
10	3			3 4 5 (9)		D-2	GS MC	ML, M.C. = 16% Sandy SILT, loose, brown, moist, Homogeneous. Length Recovered 1.5 ft, Length Retained 1.0 ft		
	4			RQD 0 FF 26		C-3		GRANITE, yellowish orange, medium grained, completely weathered, very weak rock. Discontinuities are very widely spaced and in very poor condition, Percent Recovered 71.0%		
15	5			41 50/4 (50) RQD 0 FF 26		D-4 C-5	GS MC	SM, M.C. = 15%, PI = NP GRANITE, yellowish orange, medium grained, completely weathered, very weak rock. Discontinuities are very widely spaced and in very poor condition Length Recovered 0.8 ft, Length Retained 0.8 ft GRANITE, yellowish orange, medium grained, completely weathered, very weak rock. Discontinuities are very widely spaced and in very poor condition, Percent Recovered 68.0%		
20	6									

SOIL ALL XL-2201 NSLAC - PERRY, MARKET AND FAIRVIEW STRUCTURES.GPJ SOIL.GDT 2/10/05,10:53:44 A2

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S 23721

Job No. XL-2201 SR 395 Elevation 2048.6 ft (624.4 m) HOLE No. FV-4-04

Sheet 2 of 4

Project NSLAC - Perry, Market and Fairview Structures Driller Kerry Cooper Lic# 2552

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				50/5 (50) RQD 0 FF 26		D-6 C-7		GRANITE, yellowish orange, medium grained, completely weathered, very weak rock. Discontinuities are very widely spaced and in very poor condition Length Recovered 0.4 ft, Length Retained 0.4 ft GRANITE, yellowish orange, medium grained, completely weathered, very weak rock. Discontinuities are very widely spaced and in very poor condition, Percent Recovered 88.0%		
25	7			50/5 (50) RQD 0 FF 26		D-8 C-9		GRANITE, yellowish orange, medium grained, completely weathered, very weak rock. Discontinuities are very widely spaced and in very poor condition Length Recovered 0.4 ft, Length Retained 0.4 ft GRANITE, yellowish orange, medium grained, completely weathered, very weak rock. Discontinuities are very widely spaced and in very poor condition, Percent Recovered 85.0%		
30	8 9			50/3 (50) RQD 0 FF 26		D-10 C-11		GRANITE, yellowish orange, medium grained, completely weathered, very weak rock. Discontinuities are very widely spaced and in very poor condition Length Recovered 0.2 ft, Length Retained 0.2 ft GRANITE, yellowish orange, medium grained, completely weathered, very weak rock. Discontinuities are very widely spaced and in very poor condition, Percent Recovered 42.0%		
35	10 11			50/5 (50) RQD 0 FF 26		D-12 C-13		GRANITE, yellowish orange, medium grained, completely weathered, very weak rock. Discontinuities are very widely spaced and in very poor condition Length Recovered 0.3 ft, Length Retained 0.3 ft GRANITE, yellowish orange, medium grained, completely weathered, very weak rock. Discontinuities are closely spaced and in very poor condition, Percent Recovered 99.0%		
40	12			50/3 (50) RQD 0 FF 26		D-14 C-15		GRANITE, yellowish orange, medium grained, completely weathered, very weak rock. Discontinuities are closely spaced and in very poor condition Length Recovered 0.2 ft, Length Retained 0.2 ft GRANITE, yellowish orange, medium grained, completely weathered, very weak rock. Discontinuities are very closely spaced and in very poor condition, Percent Recovered 100.0%		
45	13		>>							

SOIL ALL XL-2201 NSLAC - PERRY, MARKET AND FAIRVIEW STRUCTURES.GPJ SOIL.GDT 2/10/05,10:53:44 A2

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S 23721

Job No. XL-2201 SR 395 Elevation 2048.6 ft (624.4 m) HOLE No. FV-4-04

Sheet 3 of 4

Project NSLAC - Perry, Market and Fairview Structures Driller Kerry Cooper Lic# 2552

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
	14		>>	70/3 (70) RQD 0 FF 26		D-16 C-17		GRANITE, yellowish orange, medium grained, completely weathered, very weak rock. Discontinuities are very closely spaced and in very poor condition Length Recovered 0.2 ft, Length Retained 0.2 ft GRANITE, yellowish orange, medium grained, completely weathered, very weak rock. Discontinuities are very closely spaced and in very poor condition, Percent Recovered 100.0%		
	15									
50			>>	85/5 (85) RQD 0 FF 26		D-18 C-19		GRANITE, yellowish orange, medium grained, completely weathered, very weak rock, HCl reaction not tested. Discontinuities are very closely spaced and in very poor condition Length Recovered 0.4 ft, Length Retained 0.4 ft GRANITE, yellowish orange, medium grained, completely weathered, very weak rock. Discontinuities are very widely spaced and in very poor condition, Percent Recovered 79.0%		
	16									
55				50/2 (50) RQD 0 FF 26		D-20 C-21		GRANITE, yellowish orange, medium grained, completely weathered, very weak rock. Discontinuities are very closely spaced and in very poor condition Length Recovered 0.1 ft, Length Retained 0.1 ft GRANITE, yellowish orange, medium grained, completely weathered, very weak rock. Discontinuities are very closely spaced and in very poor condition, Percent Recovered 100.0%		
	17									
	18									
60				50/2 (50) RQD 62 FF 5		D-22 C-23		GRANITE, yellowish orange, medium grained, completely weathered, very weak rock, HCl reaction not tested. Discontinuities are very closely spaced and in very poor condition Length Recovered 0.1 ft, Length Retained 0.1 ft GRANITE, light greenish gray, medium grained, moderately weathered, moderately weak rock. Discontinuities are very closely spaced and in poor condition, Percent Recovered 100.0%		
	19									
65			>>	65/2 (65) RQD 53 FF 6		D-24 C-25		No Recovery Basalt , medium dark gray, fine grained, slightly weathered, strong rock. Discontinuities are closely spaced and in fair condition, changed GRANITE at 2.9', Percent Recovered 100.0%		
	20									
	21									
70										

SOIL ALL XL-2201 NSLAC - PERRY, MARKET AND FAIRVIEW STRUCTURES.GPJ SOIL.GDT 2/10/05,10:53:44 A2

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S 23721

Job No. XL-2201 SR 395 Elevation 2048.6 ft (624.4 m)

HOLE No. FV-4-04

Sheet 4 of 4

Project NSLAC - Perry, Market and Fairview Structures

Driller Kerry Cooper Lic# 2552

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
	22			RQD 56 FF 7		C-26		GRANITE with iron mineral infilling, light greenish gray, fine grained, slightly weathered, very strong rock. Discontinuities are closely spaced and in fair condition, Percent Recovered 100.0%		
75	23							End of test hole boring at 75 ft below ground elevation. This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications and laboratory test data. Bailed hole to dry, no recharge. Ended and abandoned test boring at 75.0' below ground elevation. Dry hole. 9/28/04.		
	24									
80										
	25									
85	26									
	27									
90										
	28									
95										

SOIL ALL XL-2201 NSLAC - PERRY, MARKET AND FAIRVIEW STRUCTURES.GPJ SOIL.GDT 2/10/05,10:53:44 A2

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S 23721

Job No. XL-2201 SR 395 Elevation 2067.6 ft (630.2 m)

HOLE No. FV-5-04

Sheet 1 of 2

Project NSLAC - Perry, Market and Fairview Structures

Driller Kerry Cooper Lic# 2552

Site Address Vicinity of fairview Road and Proposed SR-395

Inspector Cleo Andrews

Start September 29, 2004 Completion September 29, 2004 Well ID# Equipment CME 45 w/ autohammer

Station LR 340+62.05 Offset 45.93' Rt. Casing HQ 3" ID x 45.0' Method Wet Rotary

Northing 618268.7 Easting 2823069.463 Latitude Longitude

County Spokane Subsection SE 1/4 of the SW 1/4 Section 15 Range 43 EWM Township 26

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
5	1			2 4 3 (7)		D-1		Poorly graded SAND, loose, brown, moist, Homogeneous. 0.0' to 6.0' Poorly graded Sand as indicated by drilling and wash return. 100% drilling fluid return. Length Recovered 1.5 ft, Length Retained 1.0 ft		
10	3		>>	20 27 45 (72)		D-2		GRANITE, light yellowish orange, medium grained, completely weathered, very weak rock. Length Recovered 1.5 ft, Length Retained 1.0 ft		
15	5		>>	60/6 (60)		D-3		GRANITE, yellowish orange, medium grained, completely weathered, very weak rock. Discontinuities are very widely spaced and in very poor condition Length Recovered 0.5 ft, Length Retained 0.5 ft		
20	6									

SOIL ALL XL-2201 NSLAC - PERRY, MARKET AND FAIRVIEW STRUCTURES.GPJ SOIL.GDT 2/10/05,10:53:44 A2

Washington State
Department of Transportation

LOG OF TEST BORING

Start Card S 23721

Job No. XL-2201 SR 395 Elevation 2067.6 ft (630.2 m) HOLE No. FV-5-04

Sheet 2 of 2

Project NSLAC - Perry, Market and Fairview Structures Driller Kerry Cooper Lic# 2552

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
			>>	70/4 (70)		D-4		GRANITE, yellowish orange, medium grained, completely weathered, very weak rock. Discontinuities are very widely spaced and in very poor condition Length Recovered 0.3 ft, Length Retained 0.3 ft		
25	7									
			>>	100/4 (100) RQD 0.125 FF 24		D-5 C-6		GRANITE, brownish gray, medium grained, completely weathered, very weak rock. Discontinuities are very widely spaced and in very poor condition Length Recovered 0.3 ft, Length Retained 0.3 ft GRANITE with iron minerial infillings, moderately fractured, light greenish gray, medium grained, highly weathered, very weak rock. Discontinuities are closely spaced and in very poor condition, changed to more in tact rock at 28.0', Percent Recovered 100.0%		
30	8									
	9									
				RQD 56 FF 5		C-7		GRANITE, moderately fractured, light greenish gray, medium grained, slightly weathered, very strong rock. Discontinuities are closely spaced and in fair condition, Percent Recovered 100.0%		
	10									
35										
	11			RQD 65 FF 8		C-8		GRANITE with iron minerial infillings, moderately fractured, light greenish gray, medium grained, slightly weathered, very strong rock. Discontinuities are closely spaced and in fair condition, (Note 100% drilling fluid loss starting at 31.0'). Percent Recovered 100.0%		
	12									
40										
	13							End of test hole boring at 41 ft below ground elevation. This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications and laboratory test data.		
45								Ended and abandoned test boring at 41.0' below ground elevation.. Dry hole. 9/29/04.		

SOIL ALL XL-2201 NSLAC - PERRY, MARKET AND FAIRVIEW STRUCTURES.GPJ SOIL.GDT 2/10/05,10:53:45 A2

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S-23735

HOLE No. FV-9-04

Sheet 1 of 2

Job No. XL-2201 SR 395 Elevation 1996.2 ft (608.4 m)

Project NSLAC - Perry, Market and Fairview Structures

Driller Sean Verlo Lic# 2615

Site Address Fairview & Proposed SR 395

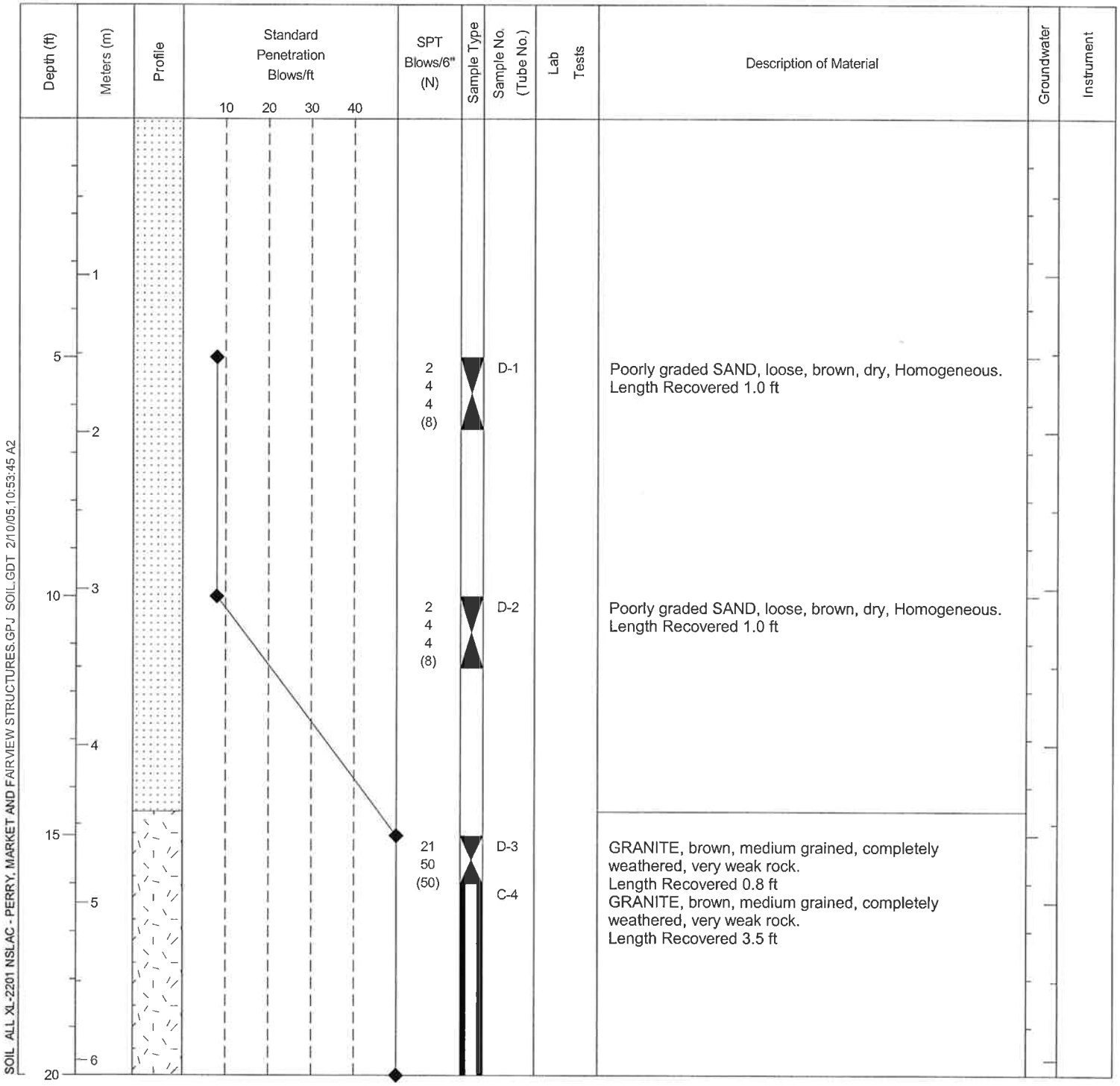
Inspector Dave Nelson

Start December 15, 2004 Completion December 16, 2004 Well ID# Equipment CME 45 w/ autohammer

Station LR 342+20.49 Offset 25.86' Rt. Casing HQ x 25.0 Method Wet Rotary

Northing Easting Latitude Longitude

County Spokane Subsection SW 1/4 of Se 1/4 Section 15 Range 43 EWM Township 26



SOIL ALL XL-2201 NSLAC - PERRY, MARKET AND FAIRVIEW STRUCTURES.GPJ SOIL.GDT 2/10/05 10:53:45 A2

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S-23735

Job No. XL-2201 SR 395 Elevation 1996.2 ft (608.4 m)

HOLE No. FV-9-04

Sheet 2 of 2

Project NSLAC - Perry, Market and Fairview Structures

Driller Sean Verlo Lic# 2615

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				50 (50)		D-5 C-6		GRANITE, brown, medium grained, completely weathered, very weak rock. Length Recovered 0.5 ft GRANITE, brown, medium grained, completely weathered, very weak rock. Length Recovered 1.7 ft		
25	7			50 (50)		D-7		GRANITE, brown, medium grained, completely weathered, very weak rock. Length Recovered 0.4 ft		
	8							End of test hole boring at 25.4 ft below ground elevation. This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications and laboratory test data.		
30	9									
	10									
35	11									
	12									
40	13									
45										

SOIL ALL XL-2201 NSLAC - PERRY, MARKET AND FAIRVIEW STRUCTURES.GPJ SOIL.GDT 2/10/05,10:53:45 A2

Washington State Department of Transportation

LOG OF TEST BORING

Start Card _____

Job No. XL-2201 SR 395 Elevation 1955.3 ft (596.0 m)

HOLE No. MRK-1-00

Sheet 1 of 3

Project NSLAC - Perry, Market and Fairview Structures

Driller Ben Gooding Lic# _____

Site Address _____

Inspector RRR

Start October 24, 2000 Completion October 24, 2000 Well ID# _____

Equipment B-61

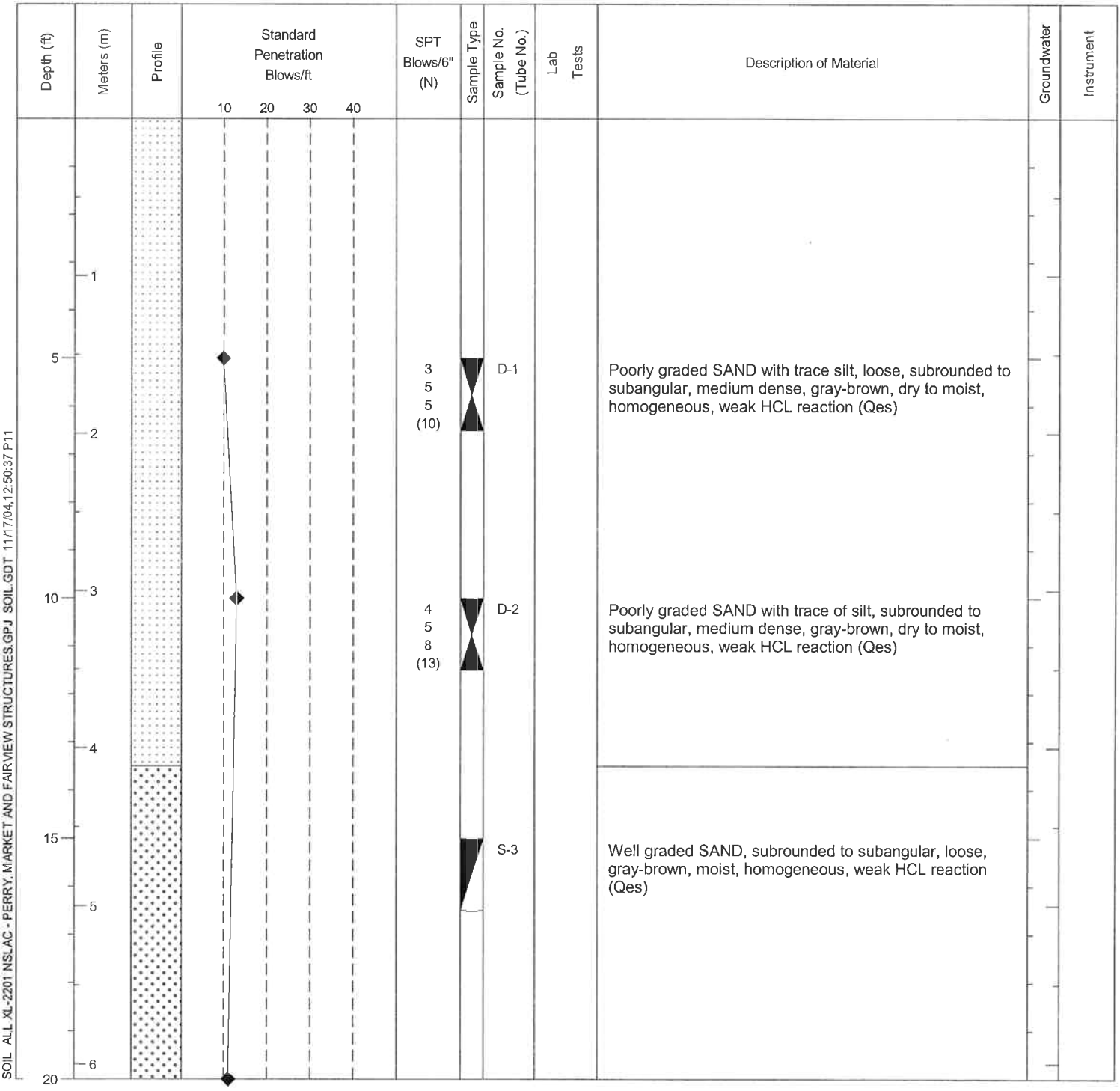
Station LR 377+89.5 Offset 29.7ft Rt. Casing 8-in HSA

Method 8-in Hollow Stem Auger

Northing 621983 Easting 2823022 Latitude _____

Longitude _____

County Spokane Subsection _____ Section _____ Range _____ Township _____



SOIL ALL XL-2201 NSLAC - PERRY, MARKET AND FAIRVIEW STRUCTURES.GPJ SOIL.GDT 11/17/04,12:50:37 P11

Washington State Department of Transportation

LOG OF TEST BORING

Start Card _____

Job No. XL-2201 SR 395 Elevation 1955.3 ft (596.0 m)

HOLE No. MRK-1-00

Sheet 2 of 3

Project NSLAC - Perry, Market and Fairview Structures

Driller Ben Gooding Lic# _____

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				4 5 6 (11)		D-4	GS MC	SP, M.C.=16% Poorly graded SAND, subangular to subrounded, medium dense, gray-brown, moist, homogeneous, weak HCL reaction (Qf)		
	7									
25				4 6 9 (15)		D-5		Well graded SAND, subrounded to subangular, medium dense, gray-brown, moist, homogeneous, weak HCL reaction (Qf)		
	8									
	9									
30				6 6 9 (15)		D-6	GS MC	SM, M.C. Silty SAND, subrounded to subangular, medium dense, brown to light brown, homogeneous, weak HCL reaction (Qf)		
	10									
35				8 11 16 (27)		D-7		Well graded SAND, subrounded to subangular, dense, gray - brown, homogeneous, strong HCL reaction (Qf)		
	11									
	12									
40				13 15 18 (33)		D-8		Well graded SAND, subrounded to subangular, dense, gray - brown, homogeneous, strong HCL reaction (Qf)		
	13									
45			>>							

SOIL ALL XL-2201 NSLAC - PERRY, MARKET AND FAIRVIEW STRUCTURES.GPJ SOIL.GDT 11/17/04 12:50:37 P11

Washington State Department of Transportation

LOG OF TEST BORING

Start Card _____

Job No. XL-2201 SR 395 Elevation 1955.3 ft (596.0 m) HOLE No. MRK-1-00

Sheet 3 of 3

Project NSLAC - Perry, Market and Fairview Structures Driller Ben Gooding Lic# _____

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
	14		>>	18 29 34 (63)		D-9		Well graded SAND, subrounded to subangular, very dense, gray - brown, homogeneous, strong HCL reaction (Qf)		
	15									
50			>>	22 25 28 (53)		D-10		Well graded SAND, subrounded to subangular, very dense, gray - brown, homogeneous, strong HCL reaction (Qf)		
	16							End of test hole boring at 51.5 ft below ground elevation.		
								This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications.		
55	17									
	18									
60										
	19									
65										
	20									
	21									
70										

SOIL ALL XL-2201 NSLAC - PERRY, MARKET AND FAIRVIEW STRUCTURES.GPJ SOIL.GDT 11/17/04 12:50:37 P11

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S 23722

Job No. XL-2201 SR 395 Elevation 1949.3 ft (594.1 m) HOLE No. MRK-2-04

Sheet 1 of 5

Project NSLAC - Perry, Market and Fairview Structures Driller Fetterly Lic# 2708

Site Address VIC of Market st & E Hawthorn Rd. Inspector Hanning

Start October 6, 2004 Completion October 7, 2004 Well ID# NA Equipment CME 850 w/ autohammer

Station LR 376+93.9 Offset 29.5ft Rt. Casing 3.5" Method Wet Rotary

Northing 621891.642 Easting 2823052.885 Latitude Longitude

County Spokane Subsection SE/NW Section 15 Range 43 EWM Township 26N

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
5	1			3 5 5 (10)		D-1		Poorly graded SAND with trace of mica, loose, olive brown, moist, Homogeneous, HCl reaction not tested Length Recovered 0.8 ft, Length Retained 0.8 ft		
10	3			3 6 5 (11)		D-2	GS MC	SP, M.C. = 4% Poorly graded SAND with trace of mica, medium dense, olive brown, moist, Homogeneous, HCl reaction not tested Length Recovered 1.0 ft, Length Retained 1.0 ft		
15	5			3 4 5 (9)		D-3		Poorly graded SAND, with some wood and trace of mica, loose, olive gray, moist, Stratified, HCl reaction not tested Length Recovered 1.0 ft, Length Retained 1.0 ft		
20	6			3 4		D-4		Poorly graded SAND with trace of mica, loose, olive gray, moist, Stratified, HCl reaction not tested		

SOIL ALL XL-2201 NSLAC - PERRY, MARKET AND FAIRVIEW STRUCTURES.GPJ SOIL.GDT 11/17/04 12:50:41 P11

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S 23722

Job No. XL-2201 SR 395 Elevation 1949.3 ft (594.1 m) HOLE No. MRK-2-04

Sheet 2 of 5

Project NSLAC - Perry, Market and Fairview Structures Driller Fetterly Lic# 2708

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				5 (9)				Length Recovered 1.0 ft, Length Retained 1.0 ft		
	7									
25				4 8 13 (21)		D-5		Poorly graded SAND with trace of mica, medium dense, olive brown, moist, Stratified, HCl reaction not tested Length Recovered 1.5 ft, Length Retained 1.5 ft		
	8									
	9			13 18 21 (39)		D-6		Poorly graded SAND, with trace silt & fine gravel, dense, olive gray, moist, Stratified, HCl reaction not tested Length Recovered 1.5 ft, Length Retained 1.5 ft		
30										
	10									
				15 20 19 (39)		D-7	GS MC	SP, M.C. = 14% Poorly graded SAND, dense, olive gray, moist, Stratified, HCl reaction not tested Length Recovered 1.0 ft, Length Retained 1.0 ft		
35	11									
				15 17 21 (38)		D-8		Well graded SAND, dense, olive gray, moist, Stratified, HCl reaction not tested Length Recovered 1.0 ft, Length Retained 1.0 ft		
	12									
40										
	13									
				10 12		D-9		Well graded SAND, with some medium gravel, dense, olive gray, moist, Stratified, HCl reaction not tested		
45										

SOIL ALL XL-2201 NSLAC - PERRY, MARKET AND FAIRVIEW STRUCTURES.GPJ SOIL.GDT 11/17/04,12:50:41 P11

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S 23722

Job No. XL-2201 SR 395 Elevation 1949.3 ft (594.1 m)

HOLE No. MRK-2-04

Sheet 3 of 5

Project NSLAC - Perry, Market and Fairview Structures

Driller Fetterly Lic# 2708

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				18 (30)				Length Recovered 1.0 ft, Length Retained 1.0 ft		
	14									
	15			11 11 21 (32)		D-10		Well graded SAND, with some fine gravel, dense, olive gray, moist, Stratified, HCl reaction not tested Length Recovered 1.0 ft, Length Retained 1.0 ft		
50										
	16									
				13 16 26 (42)		D-11		Well graded SAND, with some medium gravel, dense, olive gray, moist, Stratified, HCl reaction not tested Length Recovered 1.0 ft, Length Retained 1.0 ft		
55	17									
	18			16 20 14 (34)		D-12	GS MC	SW-SM, M.C. = 13% Well graded SAND with silt and gravel, dense, olive gray, moist, Stratified, HCl reaction not tested Length Recovered 1.0 ft, Length Retained 1.0 ft		
60	19									
				12 19 23 (42)		D-13		Silty SAND with gravel, dense, olive gray, moist, Stratified, HCl reaction not tested Length Recovered 0.8 ft, Length Retained 0.8 ft		
65	20									
	21			6 16		D-14		Poorly graded SAND, with some silt stratification and trace organics, dense, light gray, moist, Stratified, HCl		
70										

SOIL ALL XL-2201 NSLAC - PERRY, MARKET AND FAIRVIEW STRUCTURES.GPJ SOIL.GDT 11/17/04 12:50:41 P11

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S 23722

Job No. XL-2201 SR 395 Elevation 1949.3 ft (594.1 m) HOLE No. MRK-2-04

Sheet 4 of 5

Project NSLAC - Perry, Market and Fairview Structures Driller Fetterly Lic# 2708

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				15 (31)				reaction not tested, Note bottom 0.4ft sandy silt, pinkish gray color. Length Recovered 1.2 ft, Length Retained 1.2 ft		
	22									
75	23			8 16 23 (39)		D-15		Clayey SAND with gravel, dense, light greenish gray, moist, Stratified, HCl reaction not tested Length Recovered 1.5 ft, Length Retained 1.5 ft		
	24									
80				10 18 26 (44)		D-16	GS MC AL	SC, M.C. = 22%, PI = 10 Clayey SAND, dense, light greenish gray, moist, Homogeneous, HCl reaction not tested Length Recovered 1.5 ft, Length Retained 1.5 ft		
	25									
				12 20 25 (45)		D-17		Clayey SAND, and fine gravel, dense, light greenish gray, moist, Homogeneous, HCl reaction not tested, Completely weathered granite. Length Recovered 1.5 ft, Length Retained 1.5 ft		
85	26									
	27									
				11 20 26 (46)		D-18		Clayey SAND, with some fine gravel, dense, greenish gray, moist, Homogeneous, HCl reaction not tested Length Recovered 1.0 ft, Length Retained 1.0 ft		
90	28									
				12 22		D-19		Clayey SAND, dense, greenish gray, moist, Homogeneous, HCl reaction not tested		
95										

SOIL ALL XL-2201 NSLAC - PERRY, MARKET AND FAIRVIEW STRUCTURES.GPJ SOIL.GDT 11/17/04 12:50:41 P11

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S 23722

Job No. XL-2201 SR 395 Elevation 1949.3 ft (594.1 m)

HOLE No. MRK-2-04

Sheet 5 of 5

Project NSLAC - Perry, Market and Fairview Structures

Driller Fetterly Lic# 2708

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
	29			25 (47)				Length Recovered 1.0 ft, Length Retained 1.0 ft		
	30									
100				14 12 23 (35)		D-20		Clayey SAND, and fine gravel, dense, greenish gray, moist, Homogeneous, HCl reaction not tested Length Recovered 1.5 ft, Length Retained 1.5 ft		
	31							End of test hole boring at 100.5 ft below ground elevation.		
								This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications and laboratory test data.		
105	32									
	33									
110										
	34									
115	35									
	36									
120										

SOIL ALL XL-2201 NSLAC - PERRY, MARKET AND FAIRVIEW STRUCTURES.GPJ SOIL.GDT 11/17/04,12:50:41 P11

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S 23722

Job No. XL-2201 SR 395 Elevation 1954.5 ft (595.7 m)

HOLE No. MRK-3-04

Sheet 1 of 5

Project NSLAC - Perry, Market and Fairview Structures

Driller Harvey Lic# 2599

Site Address Vic. of Market st & East Hawthorne

Inspector Hanning

Start September 28, 2004 Completion September 29, 2004 Well ID# NA

Equipment CME 850 w/ autohammer

Station LR 378+13.1 Offset 1.2ft Rt. Casing 3.5"

Method Wet Rotary

Northing 621995.513 Easting 2822987.007 Latitude

Longitude

County Spokane Subsection SE/NW Section 15 Range 43 EWM Township 26N

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
5	1			2 3 4 (7)		D-1		Poorly graded SAND with silt and trace of mica, loose, olive brown, moist, Homogeneous, HCl reaction not tested Length Recovered 1.0 ft, Length Retained 1.0 ft		
10	3			2 3 3 (6)		D-2		Poorly graded SAND with silt and trace of mica, loose, olive brown, moist, Stratified, HCl reaction not tested Length Recovered 0.7 ft, Length Retained 0.7 ft		
15	5			2 3 3 (6)		D-3		Poorly graded SAND with silt and trace of mica, loose, olive gray, moist, Stratified, HCl reaction not tested Length Recovered 0.8 ft, Length Retained 0.8 ft		
20	6									

SOIL ALL XL-2201 NSLAC - PERRY, MARKET AND FAIRVIEW STRUCTURES.GPJ SOIL.GDT 2/10/05 10:53:46 A2

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S 23722

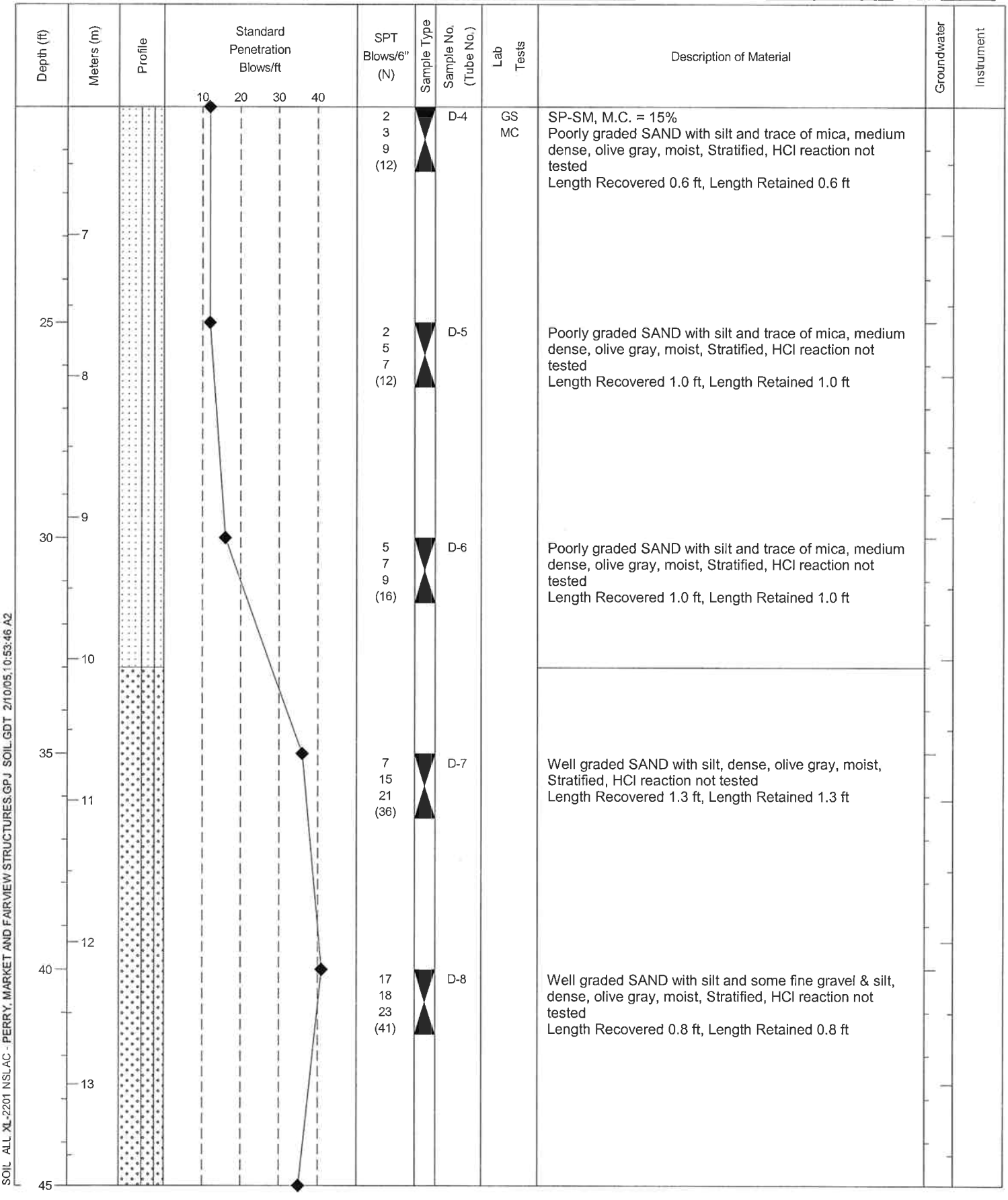
Job No. XL-2201 SR 395 Elevation 1954.5 ft (595.7 m)

HOLE No. MRK-3-04

Sheet 2 of 5

Project NSLAC - Perry, Market and Fairview Structures

Driller Harvey Lic# 2599



SOIL ALL XL-2201 NSLAC - PERRY, MARKET AND FAIRVIEW STRUCTURES.GPJ SOIL.GDT 2/10/05,10:53:46 A2

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S 23722

Job No. XL-2201 SR 395 Elevation 1954.5 ft (595.7 m)

HOLE No. MRK-3-04

Sheet 3 of 5

Project NSLAC - Perry, Market and Fairview Structures

Driller Harvey Lic# 2599

Depth (ft)	Meters (m)	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
	14		17 17 18 (35)		D-9		Well graded SAND with silt and some medium gravel & silt, dense, olive gray, moist, Stratified, HCl reaction not tested Length Recovered 1.0 ft, Length Retained 1.0 ft		
	15								
50			14 12 13 (25)		D-10		Well graded SAND with silt and some fine gravel, dense, olive gray, moist, Stratified, HCl reaction not tested Length Recovered 1.0 ft, Length Retained 1.0 ft		
	16								
55			7 18 21 (39)		D-11		Well graded SAND with silt and some fine gravel, dense, olive gray, moist, Stratified, HCl reaction not tested Length Recovered 1.3 ft, Length Retained 1.3 ft		
	17								
	18								
60			17 17 29 (46)		D-12		Well graded SAND with silt and some fine gravel, dense, olive gray, moist, Stratified, HCl reaction not tested Length Recovered 1.0 ft, Length Retained 1.0 ft		
	19								
65			16 20 25 (45)		D-13	GS MC	SW-SM, M.C. = 13% Well graded SAND with silt and some fine gravel, dense, olive gray, moist, Stratified, HCl reaction not tested Length Recovered 1.3 ft, Length Retained 1.3 ft		
	20								
	21								
70									

SOIL ALL XL-2201 NSLAC - PERRY, MARKET AND FAIRVIEW STRUCTURES.GPJ SOIL.GDT 2/10/05 10:53:46 A2

Washington State Department of Transportation

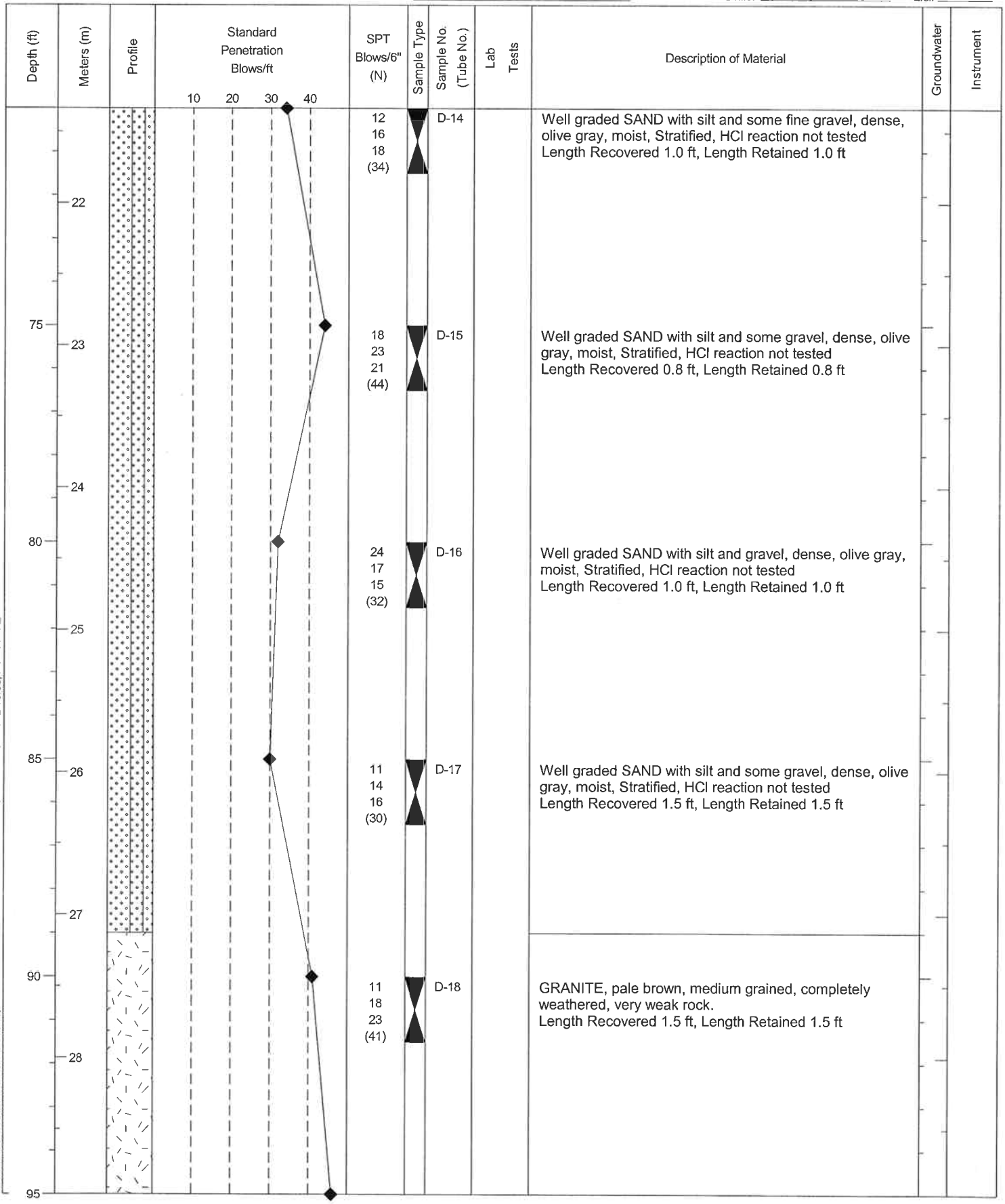
LOG OF TEST BORING

Start Card S 23722

Job No. XL-2201 SR 395 Elevation 1954.5 ft (595.7 m) HOLE No. MRK-3-04

Sheet 4 of 5

Project NSLAC - Perry, Market and Fairview Structures Driller Harvey Lic# 2599



SOIL ALL XL-2201 NSLAC - PERRY, MARKET AND FAIRVIEW STRUCTURES.GPJ SOIL.GDT 2/10/05 10:53:46 A2

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S 23722

Job No. XL-2201 SR 395 Elevation 1954.5 ft (595.7 m)

HOLE No. MRK-3-04

Sheet 5 of 5

Project NSLAC - Perry, Market and Fairview Structures

Driller Harvey Lic# 2599

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
	29			12 18 28 (46)		D-19		GRANITE, pale brown, medium grained, completely weathered, very weak rock. Length Recovered 1.5 ft, Length Retained 1.5 ft		
	30									
100			>>	14 25 32 (57)		D-20		GRANITE, pale brown, medium grained, completely weathered, very weak rock. Length Recovered 1.5 ft, Length Retained 1.5 ft		
	31									
								End of test hole boring at 101.5 ft below ground elevation. This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications and laboratory test data.		
105	32							Bailed hole, no recharge.		
	33									
110										
	34									
115	35									
	36									
120										

SOIL ALL XL-2201 NSLAC - PERRY, MARKET AND FAIRVIEW STRUCTURES.GPJ SOIL.GDT 2/10/05,10:53:46 A2

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S 23722

Job No. XL-2201 SR 395 Elevation 1958.1 ft (596.8 m)

HOLE No. MRK-4-04

Sheet 1 of 5

Project NSLAC - Perry, Market and Fairview Structures

Driller Harvey Lic# 2599

Site Address Vic. of Market st. & E. Hawthorn

Inspector Hanning

Start September 29, 2004 Completion September 30, 2004 Well ID# NA

Equipment CME 850 w/ autohammer

Station LR 378+60.1 Offset 70.4ft Rt. Casing 3.5"

Method Wet Rotary

Northing 622064.337 Easting 2823035.02 Latitude Longitude

County Spokane Subsection SE/NW Section 15 Range 43 EWM Township 26N

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
5	1			2 4 4 (8)		D-1		Poorly graded SAND with silt and trace of mica, loose, olive brown, moist, Homogeneous, HCl reaction not tested Length Recovered 0.8 ft, Length Retained 0.8 ft		
10	2 3			2 2 3 (5)		D-2		Poorly graded SAND with silt and trace of mica, loose, olive gray, moist, Stratified, HCl reaction not tested Length Recovered 0.8 ft, Length Retained 0.8 ft		
15	4 5			2 2 4 (6)		D-3		Poorly graded SAND with silt and trace of mica, loose, olive gray, moist, Stratified, HCl reaction not tested Length Recovered 0.5 ft, Length Retained 0.5 ft		
20	6			3 4		D-4		Poorly graded SAND with silt and trace of mica, loose, olive gray, moist, Stratified, HCl reaction not tested		

SOIL ALL XL-2201 NSLAC - PERRY, MARKET AND FAIRVIEW STRUCTURES.GPJ SOIL.GDT 12/8/04 12:54:09 P12

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S 23722

HOLE No. MRK-4-04

Job No. XL-2201 SR 395 Elevation 1958.1 ft (596.8 m)

Sheet 2 of 5

Project NSLAC - Perry, Market and Fairview Structures

Driller Harvey Lic# 2599

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				4 (8)				Length Recovered 1.0 ft, Length Retained 1.0 ft		
	7									
25				4 5 6 (11)		D-5		Poorly graded SAND with silt and trace of mica, medium dense, olive gray, moist, Stratified, HCl reaction not tested Length Recovered 1.0 ft, Length Retained 1.0 ft		
	8									
	9			4 5 6 (11)		D-6		Poorly graded SAND with silt and trace of mica, medium dense, olive gray, moist, Stratified, HCl reaction not tested Length Recovered 0.7 ft, Length Retained 0.7 ft		
30										
	10									
				4 5 8 (13)		D-7	GS MC	SW-SM, M.C. = 14% Well graded SAND with silt and trace of mica, medium dense, olive gray, moist, Stratified, HCl reaction not tested Length Recovered 0.8 ft, Length Retained 0.8 ft		
35	11									
	12			17 15 21 (36)		D-8	GS MC	SW-SM, M.C. = 9% Well graded SAND with silt, dense, olive gray, moist, Stratified, HCl reaction not tested Length Recovered 1.0 ft, Length Retained 1.0 ft		
40										
	13									
			>>	16 33		D-9		Well graded SAND with silt, very dense, olive gravel, moist, Stratified, HCl reaction not tested		
45										

SOIL ALL XL-2201 NSLAC - PERRY, MARKET AND FAIRVIEW STRUCTURES.GPJ SOIL.GDT 12/8/04,12:54:09 P12

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S 23722

Job No. XL-2201 SR 395 Elevation 1958.1 ft (596.8 m)

HOLE No. MRK-4-04

Sheet 3 of 5

Project NSLAC - Perry, Market and Fairview Structures

Driller Harvey Lic# 2599

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				20 (53)				Length Recovered 1.0 ft, Length Retained 1.0 ft		
	14									
	15			16 17 25 (42)		D-10		Well graded SAND with silt and some gravel, dense, olive gray, moist, Stratified, HCl reaction not tested Length Recovered 1.0 ft, Length Retained 1.0 ft		
50										
	16									
				16 15 13 (28)		D-11		Well graded SAND with silt and gravel, dense, olive gray, moist, Stratified, HCl reaction not tested Length Recovered 1.0 ft, Length Retained 1.0 ft		
55	17									
	18			8 17 26 (43)		D-12		Well graded SAND with silt, dense, olive gray, moist, Stratified, HCl reaction not tested Length Recovered 0.8 ft, Length Retained 0.8 ft		
60										
	19									
			>>	30 32 23 (55)		D-13		Well graded SAND, with silt and gravel, very dense, olive gray, moist, Stratified, HCl reaction not tested Length Recovered 1.2 ft, Length Retained 1.2 ft		
65	20									
	21			16 20		D-14		Well graded SAND with silt, dense, olive gray, moist, Stratified, HCl reaction not tested		
70										

SOIL ALL XL-2201 NSLAC - PERRY, MARKET AND FAIRVIEW STRUCTURES.GPJ SOIL.GDT 12/8/04 12:54:10 P12

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S 23722

Job No. XL-2201 SR 395 Elevation 1958.1 ft (596.8 m)

HOLE No. MRK-4-04

Sheet 4 of 5

Project NSLAC - Perry, Market and Fairview Structures

Driller Harvey Lic# 2599

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				24 (44)				Length Recovered 1.2 ft, Length Retained 1.2 ft		
	22									
				18 24 24 (48)		D-15		Well graded SAND, with silt, dense, olive gray, moist, Stratified, HCl reaction not tested Length Recovered 1.2 ft, Length Retained 1.2 ft		
75	23									
	24			18 24 20 (44)		D-16	GS MC	SW-SM, M.C. = 10% Well graded SAND with silt and gravel, dense, olive gray, moist, Stratified, HCl reaction not tested Length Recovered 0.6 ft, Length Retained 0.6 ft		
80										
	25									
				18 25 25 (50)		D-17		Silty SAND, with silt and gravel, very dense, olive gray, moist, Stratified, HCl reaction not tested Length Recovered 1.0 ft, Length Retained 1.0 ft		
85	26									
	27			11 18 26 (44)		D-18		Poorly graded SAND with silt, dense, olive gray, moist, Homogeneous, HCl reaction not tested Length Recovered 0.5 ft, Length Retained 0.5 ft		
90										
	28									
			>>	11 23		D-19		Well graded SAND with silt, stratified with silty sand, very dense, olive gray, moist, Stratified, Blocky, HCl reaction		
95										

SOIL ALL XL-2201 NSLAC - PERRY, MARKET AND FAIRVIEW STRUCTURES.GPJ SOIL.GDT 12/8/04,12:54:10 P12

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S 23722

Job No. XL-2201 SR 395 Elevation 1958.1 ft (596.8 m)

HOLE No. MRK-4-04

Sheet 5 of 5

Project NSLAC - Perry, Market and Fairview Structures

Driller Harvey Lic# 2599

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
	29			36 (59)				not tested Length Recovered 1.0 ft, Length Retained 1.0 ft		
	30			50/4" (50)		D-20		No Recovery		
100								End of test hole boring at 99.4 ft below ground elevation. This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications and laboratory test data.		
	31									
105	32									
	33									
110										
	34									
115	35									
	36									
120										

SOIL ALL XL-2201 NSLAC - PERRY, MARKET AND FAIRVIEW STRUCTURES.GPJ SOIL.GDT 12/8/04,12:54:10 P12

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S 23985

Job No. XL-2201 SR 395 Elevation 1932.4 ft (589.0 m)

HOLE No. PRK-7-04

Sheet 1 of 5

Project NSLAC - Parksmith Structures

Driller Kerry Cooper Lic# 2552

Site Address Vicinity of Park Smith and Market Street

Inspector Cleo Andrews

Start July 19, 2004 Completion July 19, 2004 Well ID# Equipment CME 45 w/ autohammer

Station LL 393+28.97 Offset 54.74' Lt. Casing HQ 3" ID x 105.0' Method Wet Rotary

Northing 623341.08 Easting 2822288.03 Latitude Longitude

County Spokane Subsection NE 1/4 of the NW 1/4 Section 15 Range 43 EWM Township 26

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
5	1			2 2 3 (5)		D-1		Well graded SAND with silt, loose, brown, moist, Stratified,0.0' to 4.0' Poorly graded Sand with some gravel as indicated by drilling and wash return. 100% drilling fluid return. Length Recovered 1.0 ft, Length Retained 1.0 ft.		
10	2 3			25 30 16 (46)		D-2	GS MC	SM, M.C. = 11% Silty SAND, dense, brown, moist, Stratified, HCl reaction not tested. Very little drilling fluid loss. Length Recovered 1.5 ft, Length Retained 1.0 ft.		
15	4 5			8 11 12 (23)		D-3	GS MC	SW-SM, M.C. = 16% Well graded SAND with silt, with silty Sand lens, medium dense, brown, moist, Laminated. Length Recovered 1.5 ft, Length Retained 1.0 ft.		
20	6			11 11		D-4		Silty SAND, medium dense, brown, moist, Homogeneous.		

SOIL XL-2201 NSLAC - PARKSMITH STRUCTURES.GPJ SOIL.GDT 2/11/05,1:26:48 P2

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S 23985

Job No. XL-2201 SR 395 Elevation 1932.4 ft (589.0 m) HOLE No. PRK-7-04

Sheet 2 of 5

Project NSLAC - Parksmith Structures Driller Kerry Cooper Lic# 2552

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				8 (19)				Length Recovered 1.5 ft, Length Retained 1.0 ft.		
	7									
25				12 18 16 (34)		D-5	GS MC	SM, M.C. = 26% Silty SAND, dense, brown, moist, Homogeneous. Length Recovered 1.5 ft, Length Retained 1.0 ft.		
	8									
				13 13 16 (29)		D-6		Poorly graded SAND with silt, dense, brown, moist, Stratified. Length Recovered 1.5 ft, Length Retained 1.0 ft.		
30	9									
	10									
				13 13 16 (29)		D-7		Poorly graded SAND with silt, medium dense, brown, moist, Stratified with 0.5 of silty sand. Length Recovered 1.5 ft, Length Retained 1.0 ft.		
35	11									
	12			13 13 10 (23)		D-8	GS MC	SP-SM, M.C. = 22% Poorly graded SAND with silt, medium dense, brown, moist, Homogeneous. Length Recovered 1.5 ft, Length Retained 1.0 ft.		
40										
	13									
				11 33		D-9		Well graded GRAVEL with sand, with sandy Silt laminated with fine grained sand, subrounded, very		
45										

SOIL XL-2201 NSLAC - PARKSMITH STRUCTURES.GPJ SOIL.GDT 2/11/05,1:26:48 P2

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S 23985

Job No. XL-2201 SR 395 Elevation 1932.4 ft (589.0 m)

HOLE No. PRK-7-04

Sheet 3 of 5

Project NSLAC - Parksmith Structures

Driller Kerry Cooper Lic# 2552

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
	14			50/5 (50)				dense, brown, moist. (Took moister can sample same depth from sandy silt zone, retained 3"). Length Recovered 1.4 ft, Length Retained 1.3 ft.		
50	15			37 50/4 (50)		D-10		Well graded SAND with silt and gravel, subrounded, very dense, grayish brown, moist, Homogeneous. (Approximately 1 to 3% drilling fluid loss at times). Length Recovered 0.5 ft, Length Retained 0.5 ft.		
	16									
55	17		>>	75/6 (75)		D-11		Well graded SAND with silt and gravel, subrounded, very dense, grayish brown, moist, Homogeneous. Length Recovered 0.5 ft, Length Retained 0.5 ft.		
	18		>>	33 25 32 (57)		D-12		Well graded SAND with silt and gravel, subrounded, very dense, grayish brown, moist, Homogeneous. Trace of brownish orange stain. Length Recovered 1.2 ft, Length Retained 1.0 ft.		
60	19									
65	20		>>	16 31 25 (56)		D-13		Well graded SAND with silt and gravel, very dense, grayish brown, moist, Homogeneous. Length Recovered 1.0 ft, Length Retained 1.0 ft.		
	21		>>	35 25		D-14		Well graded SAND with silt and gravel, subrounded, very dense, grayish brown, moist, Homogeneous.		
70										

SOIL XL-2201 NSLAC - PARKSMITH STRUCTURES.GPJ SOIL.GDT 2/11/05,1:26:48 P2

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S 23985

Job No. XL-2201 SR 395 Elevation 1932.4 ft (589.0 m) HOLE No. PRK-7-04

Sheet 4 of 5

Project NSLAC - Parksmith Structures Driller Kerry Cooper Lic# 2552

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				26 (51)				Length Recovered 1.0 ft, Length Retained 1.0 ft.		
	22									
			>>	27 26 28 (54)		D-15		Well graded SAND with silt, very dense, grayish brown, moist, Homogeneous. Length Recovered 1.2 ft, Length Retained 1.0 ft.		
75	23									
	24		>>	30 22 33 (55)		D-16		Well graded SAND with silt and gravel, very dense, brown, moist, Homogeneous, no HCl reaction. 0.1' layer of sandy silt. Length Recovered 1.5 ft, Length Retained 1.0 ft.		
80										
	25									
			>>	26 27 36 (63)		D-17		Well graded SAND with silt and gravel, very dense, brown, moist, Homogeneous. (Encountered some coarser gravel at 87.0' as indicated by drilling). Length Recovered 1.0 ft, Length Retained 1.0 ft.		
85	26									
	27			33 50/4 (50)		D-18		Well graded SAND with silt and gravel, very dense, brown, moist, Homogeneous. Length Recovered 0.8 ft, Length Retained 0.8 ft.		
90										
	28							GRANITE boulder.		
95			>>							

SOIL XL-2201 NSLAC - PARKSMITH STRUCTURES.GPJ SOIL.GDT 2/11/05 1:26:49 P2

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S 23985

Job No. XL-2201 SR 395 Elevation 1932.4 ft (589.0 m) HOLE No. PRK-7-04

Sheet 5 of 5

Project NSLAC - Parksmith Structures Driller Kerry Cooper Lic# 2552

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
	29		>>	24 30 24 (54)		D-19		Well graded SAND with silt and gravel, very dense, grayish brown, moist, Homogeneous. Length Recovered 1.0 ft, Length Retained 1.0 ft.		
	30		>>	55 51/6 (61)		D-20		Well graded SAND with silt and gravel, very dense, grayish brown, moist, Homogeneous. Trace of silt. Length Recovered 1.0 ft, Length Retained 1.0 ft		
100	31							End of test hole boring at 100 ft below ground elevation. This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications and laboratory test data. Water in casing at 15.0', pulled 5.0' of casing. Bailed hole to 98.0', waited 15 minutes dry hole. Ended and abandoned test boring at 100.0' below ground elevation. 7/19/04.		
105	32									
	33									
110	34									
	35									
115	36									
120										

SOIL XL-2201 NSLAC - PARKSMITH STRUCTURES.GPJ SOIL.GDT 2/11/05,1:26:49 P2

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S-23985

Job No. XL-2201 SR 395 Elevation 1921.0 ft (585.5 m)

HOLE No. PRK-8-04

Sheet 1 of 5

Project NSLAC - Parksmith Structures

Driller Joe Judd Lic# 2454

Site Address Parksmith & Market

Inspector Dave Nelson

Start July 19, 2004 Completion July 20, 2004 Well ID#

Equipment CME 850 w/ auto hammer

Station LR 394+47.74 Offset 35.53' Rt. Casing 6" x 50.0 & 4" x 99.0 Method Wet Rotary

Northing 623431.63 Easting 2822208.81 Latitude Longitude

County Spokane Subsection NE 1/4 of NW 1/4 Section 15 Range 43 EWM Township 26

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
5	1			3 6 6 (12)		D-1	GS MC	SP-SM, M.C. = 15% Poorly graded SAND with silt, medium dense, brown, dry, Homogeneous. Length Recovered 1.0 ft.		
10	3			6 7 8 (15)		D-2		Well graded SAND with silt, medium dense, brown, dry, Homogeneous. Length Recovered 1.0 ft.		
15	5			2 3 12 (15)		D-3	GS MC	ML, M.C. = 32% Sandy SILT, medium dense, brown, wet, Homogeneous. Length Recovered 1.0 ft.		
20	6			12 13		D-4		Well graded SAND with silt, dense, brown, dry, Homogeneous.		

SOIL XL-2201 NSLAC - PARKSMITH STRUCTURES.GPJ SOIL.GDT 2/11/05,1:26:49 P2

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S-23985

Job No. XL-2201 SR 395 Elevation 1921.0 ft (585.5 m) HOLE No. PRK-8-04

Sheet 2 of 5

Project NSLAC - Parksmith Structures Driller Joe Judd Lic# 2454

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				14 (27)				Length Recovered 1.0 ft.		
25	7 8			9 13 16 (29)		D-5	GS MC	SW-SM, M.C. = 14% Well graded SAND with silt, dense, brown, dry, Homogeneous. Length Recovered 1.0 ft.		
30	9 10			8 13 15 (28)		D-6	GS MC	SM , M.C. = 20% Silty SAND, dense, brown, dry, Homogeneous. Length Recovered 1.0 ft.		
35	11 12			5 12 25 (37)		D-7		Well graded SAND with silt and gravel, dense, brown, moist, Stratified. Silt stratified Length Recovered 1.0 ft		
40	13			16 17 22 (39)		D-8		Well graded SAND with silt and gravel, dense, brown, moist, Homogeneous. Boulder from 36.0' to 37.0'. Length Recovered 0.5 ft.		
45				12 15		D-9		Well graded SAND with silt, dense, brown, moist, Homogeneous.		

SOIL XL-2201 NSLAC - PARKSMITH STRUCTURES.GPJ SOIL.GDT 2/11/05,1:26:49 P2

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S-23985

Job No. XL-2201 SR 395 Elevation 1921.0 ft (585.5 m) HOLE No. PRK-8-04

Sheet 3 of 5

Project NSLAC - Parksmith Structures Driller Joe Judd Lic# 2454

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				29 (44)				Length Recovered 0.8 ft.		
	14									
	15			10 15 19 (34)		D-10	GS MC	SW-SM, M.C. = 12% Well graded SAND with silt, dense, brown, moist, Homogeneous. Length Recovered 1.0 ft.		
50										
	16									
				12 16 20 (36)		D-11		Well graded SAND with silt, dense, brown, moist, Homogeneous. Length Recovered 1.0 ft.		
55	17									
	18			13 16 16 (32)		D-12		Well graded SAND with silt, dense, brown, moist, Homogeneous. Length Recovered 1.0 ft.		
60										
	19									
				13 20 25 (45)		D-13		Well graded SAND with silt, dense, brown, moist, Homogeneous. Length Recovered 1.0 ft.		
65	20									
	21			17 22		D-14		Well graded SAND with silt, dense, brown, moist, Homogeneous.		
70										

SOIL XL-2201 NSLAC - PARKSMITH STRUCTURES.GPJ SOIL.GDT 2/11/05,1:26:50 P2

Washington State Department of Transportation

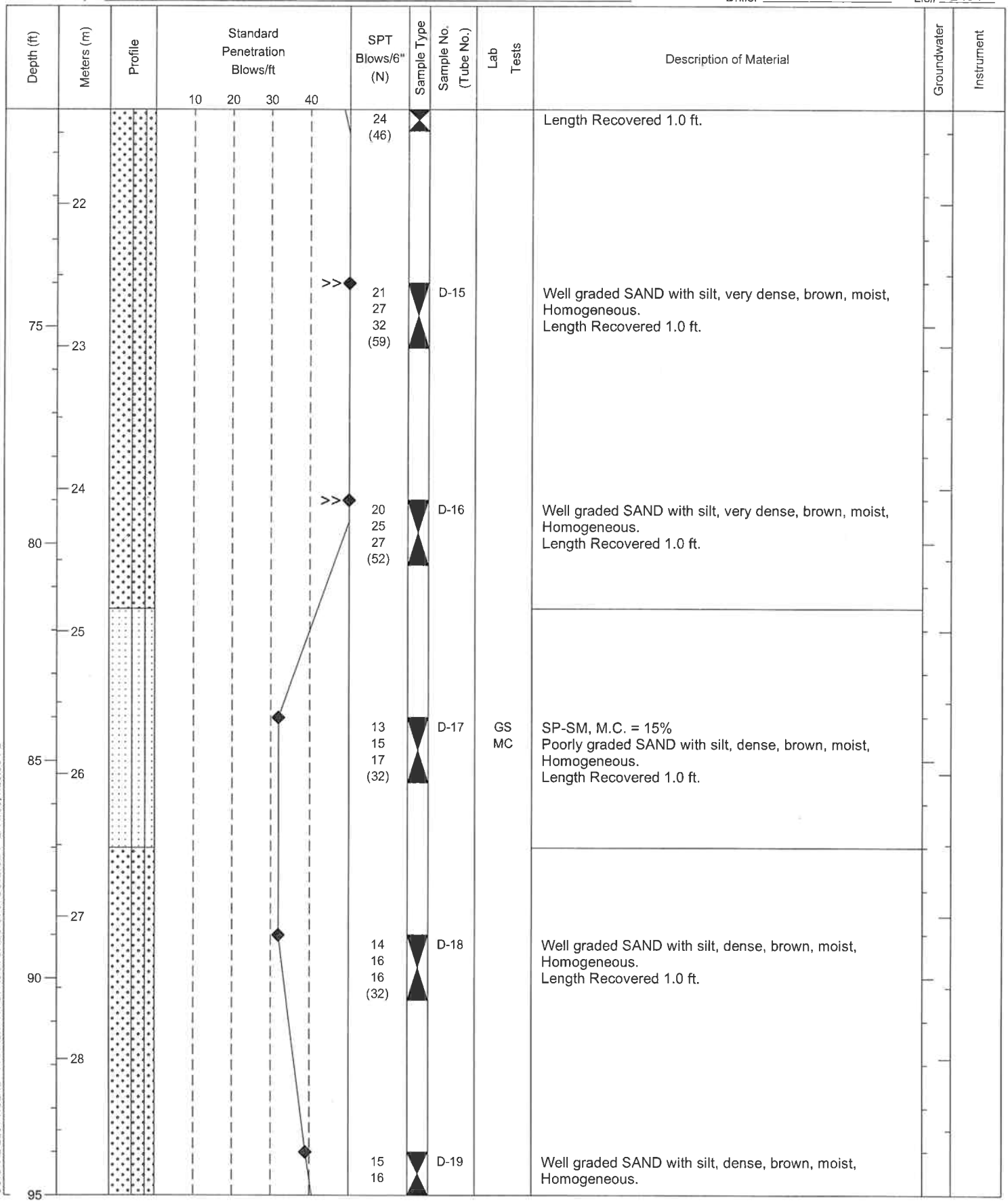
LOG OF TEST BORING

Start Card S-23985

Job No. XL-2201 SR 395 Elevation 1921.0 ft (585.5 m) HOLE No. PRK-8-04

Sheet 4 of 5

Project NSLAC - Parksmith Structures Driller Joe Judd Lic# 2454



SOIL XL-2201 NSLAC - PARKSMITH STRUCTURES.GPJ SOIL.GDT 2/11/05,1:26:50 P2

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S-23985

Job No. XL-2201 SR 395 Elevation 1921.0 ft (585.5 m) HOLE No. PRK-8-04

Sheet 5 of 5

Project NSLAC - Parksmith Structures Driller Joe Judd Lic# 2454

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
	29			23 (39)				Length Recovered 1.0 ft.		
	30									
100				15 17 30 (47)		D-20		Well graded SAND with silt, dense, brown, moist, Homogeneous. Length Recovered 1.0 ft.		
	31							End of test hole boring at 100.5 ft below ground elevation. This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications and laboratory test data. Bailed hole to 96.0 with no recharge.		
105	32									
	33									
110										
	34									
115	35									
	36									
120										

SOIL XL-2201 NSLAC - PARKSMITH STRUCTURES.GPJ SOIL.GDT 2/11/05,1:26:50 P2

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S-23985

Job No. XL-2201 SR 395 Elevation 1924.8 ft (586.7 m)

HOLE No. PRK-9-04

Sheet 1 of 5

Project NSLAC - Parksmith Structures

Driller Joe Judd Lic# 2454

Site Address Parksmith & Market

Inspector Dave Nelson

Start July 21, 2004 Completion July 21, 2004 Well ID#

Equipment CME 850 w/ autohammer

Station LR 395+53.87 Offset 52.15' Rt. Casing 4" x 99.0

Method Wet Rotary

Northing 623530.4 Easting 2822166.67 Latitude Longitude

County Spokane Subsection NE 1/4 of NW 1/4 Section 15 Range 43 EWM Township 26

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
5	1			4 3 3 (6)		D-1		Poorly graded SAND with silt and gravel , loose, brown, dry, Homogeneous. Length Recovered 1.0 ft.		
10	3			3 6 10 (16)		D-2	GS MC	SP-SM, M.C. = 20% Poorly graded SAND with silt, medium dense, brown, dry, Homogeneous. Length Recovered 1.0 ft.		
15	5			7 9 12 (21)		D-3	GS MC	SM, M.C. = 15% Silty SAND, medium dense, brown, dry, Homogeneous. Length Recovered 1.0 ft.		
20	6			8 16		D-4	GS MC	SW-SM, M.C. = 20% Well graded SAND with silt, dense, brown, moist,		

SOIL XL-2201 NSLAC - PARKSMITH STRUCTURES.GPJ SOIL.GDT 2/11/05 1:26:50 P2

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S-23985

Job No. XL-2201 SR 395 Elevation 1924.8 ft (586.7 m) HOLE No. PRK-9-04

Sheet 2 of 5

Project NSLAC - Parksmith Structures Driller Joe Judd Lic# 2454

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				19 (35)				Homogeneous. Length Recovered 1.0 ft.		
	7									
25				12 17 15 (32)		D-5		Silty SAND, medium dense, brown, moist, Homogeneous. Length Recovered 1.0 ft.		
	8									
	9			7 12 13 (25)		D-6		Silty SAND, dense, brown, moist, Homogeneous. Length Recovered 1.0 ft.		
30										
	10									
				7 14 13 (27)		D-7	GS MC	SM, M.C. = 21% Silty SAND, dense, brown, moist, Homogeneous. Length Recovered 1.0 ft.		
35	11									
	12			7 13 11 (24)		D-8		Silty SAND, medium dense, brown, moist, Homogeneous. Length Recovered 1.0 ft.		
40										
	13									
				7 14		D-9		Well graded SAND with silt and gravel, dense, grey, moist, Homogeneous.		
45										

SOIL XL-2201 NSLAC - PARKSMITH STRUCTURES.GPJ SOIL.GDT 2/11/05,1:26:51 P2

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S-23985

Job No. XL-2201 SR 395 Elevation 1924.8 ft (586.7 m) HOLE No. PRK-9-04

Sheet 3 of 5

Project NSLAC - Parksmith Structures Driller Joe Judd Lic# 2454

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				14 (28)				Length Recovered 1.0 ft.		
	14									
	15			13 16 21 (37)		D-10		Well graded SAND with silt and gravel, dense, grey, moist, Homogeneous. Length Recovered 1.0 ft.		
50										
	16									
				13 17 20 (37)		D-11		Well graded SAND with silt and gravel, dense, grey, moist, Homogeneous. Length Recovered 1.0 ft.		
55										
	17									
	18			14 18 23 (41)		D-12		Well graded SAND with silt, dense, grey, moist, Homogeneous. Length Recovered 1.0 ft.		
60										
	19									
				15 16 18 (34)		D-13		Well graded SAND with silt, dense, grey, moist, Homogeneous. Length Recovered 1.0 ft.		
65										
	20									
	21			12 18		D-14		Well graded SAND with silt, dense, grey, moist, Homogeneous.		
70										

SOIL XL-2201 NSLAC - PARKSMITH STRUCTURES.GPJ SOIL.GDT 2/11/05,1:26:51 P2

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S-23985

Job No. XL-2201 SR 395 Elevation 1924.8 ft (586.7 m) HOLE No. PRK-9-04

Sheet 4 of 5

Project NSLAC - Parksmith Structures Driller Joe Judd Lic# 2454

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				18 (36)				Length Recovered 1.0 ft.		
	22									
				13 17 19 (36)		D-15		Well graded SAND with silt, dense, grey, moist, Homogeneous. Length Recovered 1.0 ft.		
75	23									
	24		>>	12 22 29 (51)		D-16		Well graded SAND with silt, very dense, brown, moist, Homogeneous. Length Recovered 0.8 ft.		
80										
	25									
			>>	13 23 30 (53)		D-17		Well graded SAND with silt, very dense, grey, moist, Homogeneous. Length Recovered 0.9 ft		
85	26									
	27									
				9 15 18 (33)		D-18		Well graded SAND with silt, dense, grey, moist, Homogeneous. Length Recovered 1.0 ft.		
90	28									
				10 14		D-19		Well graded SAND with silt, dense, grey, moist, Homogeneous.		
95										

SOIL XL-2201 NSLAC - PARKSMITH STRUCTURES.GPJ SOIL.GDT 2/11/05 1:26:51 P2

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S-23985

Job No. XL-2201 SR 395 Elevation 1924.8 ft (586.7 m) HOLE No. PRK-9-04

Sheet 5 of 5

Project NSLAC - Parksmith Structures Driller Joe Judd Lic# 2454

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
	29			20 (34)				Length Recovered 1.0 ft.		
	30									
100				13 20 26 (46)		D-20		Well graded SAND with silt, dense, grey, moist, Homogeneous. Length Recovered 1.0 ft.		
	31							End of test hole boring at 100.5 ft below ground elevation. This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications and laboratory test data. Bailed Hole to 96.0 with no recharge.		
105	32									
	33									
110	34									
	35									
115	36									
120										

SOIL XL-2201 NSLAC - PARKSMITH STRUCTURES.GPJ SOIL.GDT 2/11/05,1:26:51 P2

Washington State
Department of Transportation

LOG OF TEST BORING

Start Card _____

Job No. XL-2201 SR 395 Elevation 1915.5 ft (583.8 m) HOLE No. PRY-1-00

Sheet 1 of 3

Project NSLAC - Perry, Market and Fairview Structures Driller Joe Lic# _____

Site Address _____ Inspector RRR

Start September 25, 2000 Completion September 26, 2000 Well ID# _____ Equipment Morooka MST-1100

Station LR 514+36 Offset 43.7ft Lt. Casing HWT Method HQ casing advance

Northing 631144.325 Easting 2815187.209 Latitude _____ Longitude _____

County Spokane Subsection _____ Section _____ Range _____ Township _____

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
5	1			7 6 5 (11)		D-1		Poorly graded SAND, medium dense, brown, moist, homogeneous, (Qf)		
10	3			5 6 7 (13)		D-2	GS MC	SP, MC=10% Poorly graded SAND, medium dense, brown, moist, homogeneous, (Qf)		
15	5			13 14 17 (31)		D-3		Poorly graded SAND, dense, brown, moist, homogeneous, (Qf)		
20	6			10		D-4				

SOIL ALL XL-2201 NSLAC - PERRY, MARKET AND FAIRVIEW STRUCTURES.GPJ SOIL.GDT 12/1/04 13:55:01

Washington State Department of Transportation

LOG OF TEST BORING

Start Card _____

Job No. XL-2201 SR 395 Elevation 1915.5 ft (583.8 m) HOLE No. PRY-1-00

Sheet 2 of 3

Project NSLAC - Perry, Market and Fairview Structures Driller Joe Lic# _____

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				16 21 (37)				Well graded SAND, dense, brown, wet, homogeneous, (Qf)		
25	7			10 12 16 (28)		D-5	GS MC	SW, MC=21% Well graded SAND, dense, brown, moist, homogeneous, (Qf)		
30	8 9			12 15 18 (33)		D-6		Poorly graded SAND, dense, brown, moist, homogeneous, (Qf)		
35	10 11			13 17 22 (39)		D-7	GS MC	SP, MC=15% Poorly graded SAND, dense, brown, moist, homogeneous, (Qf)		
40	12 13			8 14 16 (30)		D-8		Poorly graded SAND, dense, brown, moist, homogeneous, (Qf)		
45				12		D-9				

SOIL ALL XL-2201 NSLAC - PERRY, MARKET AND FAIRVIEW STRUCTURES.GPJ SOIL.GDT 12/1/04 13:55:01

Washington State Department of Transportation

LOG OF TEST BORING

Start Card _____

Job No. XL-2201 SR 395 Elevation 1915.5 ft (583.8 m) HOLE No. PRY-1-00

Sheet 3 of 3

Project NSLAC - Perry, Market and Fairview Structures Driller Joe Lic# _____

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
	14			14 18 (32)				Poorly graded SAND, dense, brown, moist, homogeneous, (Qf)		
	15									
50				15 14 17 (31)		D-10		Poorly graded SAND with trace of fine gravel, dense, brown, moist, homogeneous, (Qf)		
	16							End of test hole boring at 51 ft below ground elevation.		
								This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications.		
55								No water table was encountered during drilling. Hole was dry during 5/01 to 3/03		
	17									
	18									
60										
	19									
65										
	20									
	21									
70										

SOIL ALL XL-2201 NSLAC - PERRY, MARKET AND FAIRVIEW STRUCTURES.GPJ SOIL.GDT 12/1/04 13:55:01

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S 23723

Job No. XL-2201 SR 395 Elevation 1905.3 ft (580.7 m) HOLE No. PRY-2-04

Sheet 1 of 4

Project NSLAC - Perry, Market and Fairview Structures Driller Fetterly Lic# 2708

Site Address Vic. Perry st & proposed SR 395 Inspector Hanning

Start October 5, 2004 Completion October 5, 2004 Well ID# NA Equipment CME 850 w/ autohammer

Station LR 514+06 Offset 200.8' Lt. Casing 3.5" Method Wet Rotary

Northing 630989.018 Easting 2815225.067 Latitude Longitude

County Spokane Subsection NW/SW Section 4 Range 43 EWM Township 26N

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
5	1			3 3 5 (8)		D-1		Poorly graded SAND with silt, loose, olive gray, moist, Stratified. Length Recovered 0.8 ft, Length Retained 0.8 ft		
10	3			2 3 6 (9)		D-2	GS MC	SP-SM, M.C. = 13% Poorly graded SAND with silt, loose, olive gray, moist, Stratified. Length Recovered 0.8 ft, Length Retained 0.8 ft		
15	5			3 6 9 (15)		D-3		Poorly graded SAND with silt, medium dense, olive gray, moist, Stratified. Length Recovered 1.0 ft, Length Retained 1.0 ft		
20	6									

SOIL ALL XL-2201 NSLAC - PERRY, MARKET AND FAIRVIEW STRUCTURES.GPJ SOIL.GDT 2/10/05,2:46:59 P2

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S 23723

Job No. XL-2201 SR 395 Elevation 1905.3 ft (580.7 m) HOLE No. PRY-2-04

Sheet 2 of 4

Project NSLAC - Perry, Market and Fairview Structures Driller Fetterly Lic# 2708

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				6 13 21 (34)		D-4	GS MC	SP-SM, M.C. = 10% Poorly graded SAND with silt, with some fine gravel, dense, olive gray, moist, Stratified. Length Recovered 1.2 ft, Length Retained 1.2 ft		
	7			10 13 15 (28)		D-5	GS MC	SP-SM, M.C. = 10% Poorly graded SAND with silt, dense, olive gray, moist, Stratified. Length Recovered 1.0 ft, Length Retained 1.0 ft		
25				11 16 17 (33)		D-6		Poorly graded SAND with silt, dense, olive gray, moist, Stratified. Length Recovered 1.2 ft, Length Retained 1.2 ft		
	8									
				11 16 17 (33)		D-7	GS MC	SP-SM, M.C. = 19% Poorly graded SAND with silt, dense, olive gray, moist, Stratified. Length Recovered 1.0 ft, Length Retained 1.0 ft		
	9									
30				13 16 17 (33)		D-8	GS MC	SP-SM, M.C. = 17% Poorly graded SAND with silt, dense, olive gray, moist, Stratified. Length Recovered 1.0 ft, Length Retained 1.0 ft		
	10			14 13 12 (25)		D-9	GS MC	SP, M.C. = 18% Poorly graded SAND, dense, olive gray, moist, Stratified. Length Recovered 1.0 ft, Length Retained 1.0 ft		
35				11 14 13 (27)		D-10		Well graded SAND, dense, olive gray, moist, Stratified. Length Recovered 1.0 ft, Length Retained 1.0 ft		
	11									
				10 12 13 (25)		D-11	GS MC	SP, M.C. = 16% Poorly graded SAND, dense, olive gray, moist, Stratified. Length Recovered 1.0 ft, Length Retained 1.0 ft		
	12									
40				10 13 15 (28)		D-12		Poorly graded SAND, dense, olive gray, moist, Stratified. Length Recovered 1.0 ft, Length Retained 1.0 ft		
	13									
45										

SOIL ALL XL-2201 NSLAC - PERRY, MARKET AND FAIRVIEW STRUCTURES.GPJ SOIL.GDT 2/10/05,2:46:59 P2

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S 23723

Job No. XL-2201 SR 395 Elevation 1905.3 ft (580.7 m)

HOLE No. PRY-2-04

Sheet 3 of 4

Project NSLAC - Perry, Market and Fairview Structures

Driller Fetterly Lic# 2708

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
	14			13 15 16 (31)		D-13		Poorly graded SAND, dense, olive gray, moist, Stratified. Length Recovered 1.0 ft, Length Retained 1.0 ft		
	15									
50				13 13 17 (30)		D-14		Poorly graded SAND, dense, olive gray, moist, Stratified. Length Recovered 1.0 ft, Length Retained 1.0 ft		
	16									
55				13 15 17 (32)		D-15		Poorly graded SAND, dense, olive gray, moist, Stratified. Length Recovered 1.0 ft, Length Retained 1.0 ft		
	17									
	18									
60				12 16 16 (32)		D-16		Poorly graded SAND, dense, olive gray, moist, Stratified. Length Recovered 1.0 ft, Length Retained 1.0 ft		
	19									
65				15 16 16 (32)		D-17		Poorly graded SAND, dense, olive gray, moist, Stratified. Length Recovered 1.0 ft, Length Retained 1.0 ft		
	20									
	21									
70										

SOIL ALL XL-2201 NSLAC - PERRY, MARKET AND FAIRVIEW STRUCTURES.GPJ SOIL.GDT 2/10/05,2:46:59 P2

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S 23723

Job No. XL-2201 SR 395 Elevation 1905.3 ft (580.7 m)

HOLE No. PRY-2-04

Sheet 4 of 4

Project NSLAC - Perry, Market and Fairview Structures

Driller Fetterly Lic#. 2708

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				15 16 17 (33)		D-18		Poorly graded SAND, dense, olive gray, moist, Stratified. Length Recovered 1.0 ft, Length Retained 1.0 ft		
	22									
75	23			15 17 17 (34)		D-19		Poorly graded SAND, dense, olive gray, moist, Stratified. Length Recovered 1.0 ft, Length Retained 1.0 ft		
								End of test hole boring at 76.5 ft below ground elevation. This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications and laboratory test data. Bail/recharge. No water		
	24									
80	25									
85	26									
	27									
90	28									
95										

SOIL ALL XL-2201 NSLAC - PERRY, MARKET AND FAIRVIEW STRUCTURES.GPJ SOIL.GDT 2/10/05 2:47:00 P2

Washington State Department of Transportation

LOG OF TEST BORING

Start Card R 65924

Job No. XL-2201 SR 395 Elevation 1916.3 ft (584.1 m)

HOLE No. PRY-3-04

Sheet 1 of 4

Project NSLAC - Perry, Market and Fairview Structures

Driller Kerry Cooper Lic# 2552

Site Address Vicinity of Perry and Proposed SR-395

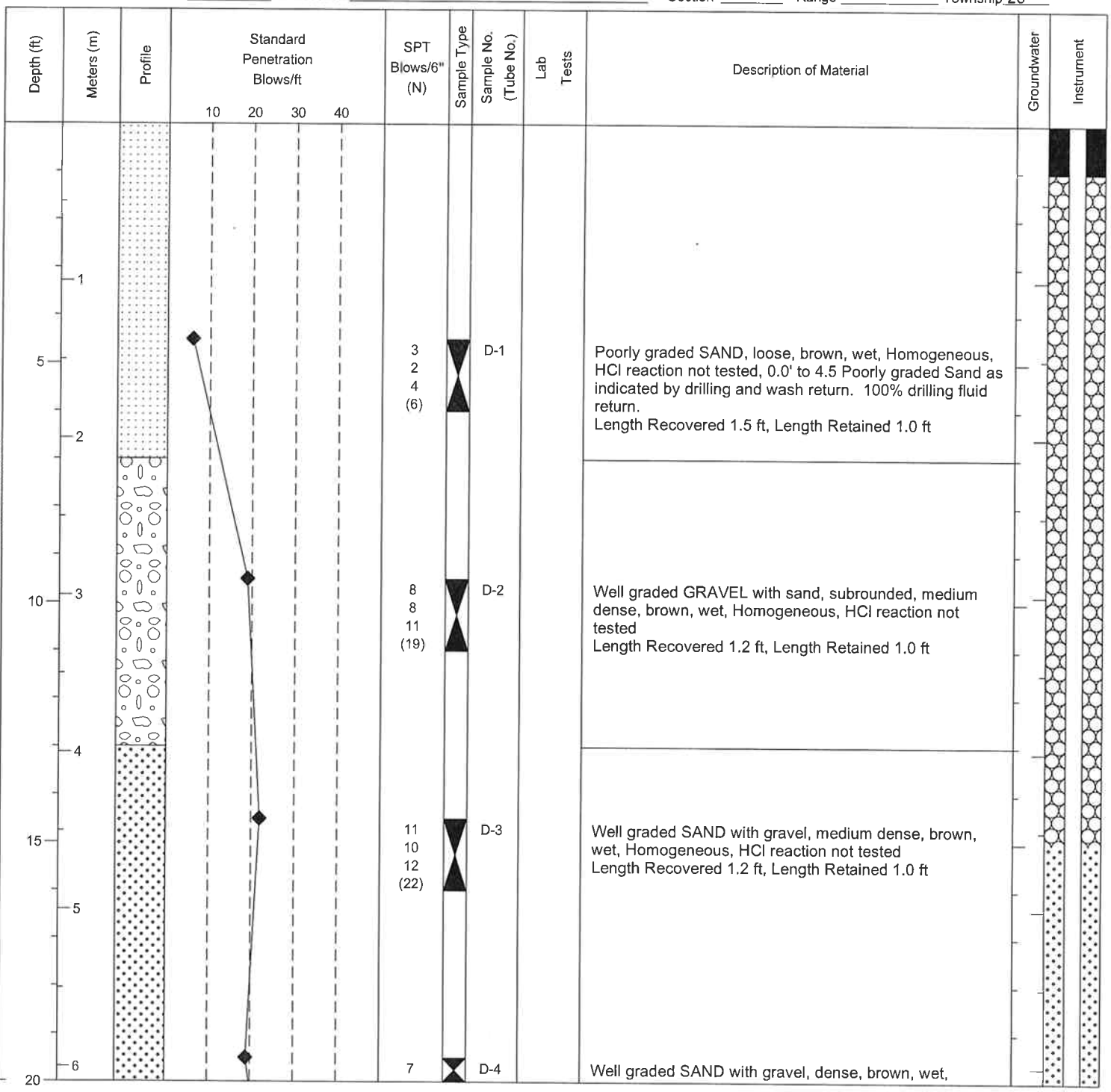
Inspector Cleo Andrews

Start September 29, 2004 Completion September 30, 2004 Well ID# AHN-706 Equipment CME 45 w/ autohammer

Station LR 514+01 Offset 100.7' Rt. Casing HQ 3" ID x 80.0' Method Wet Rotary

Northing 631290.314 Easting 2815214.338 Latitude Longitude

County Spokane Subsection NW 1/4 of the SW 1/4 Section 4 Range 43 EWM Township 26



SOIL ALL XL-2201 NSLAC - PERRY, MARKET AND FAIRVIEW STRUCTURES.GPJ SOIL.GDT 2/10/05,2:47:00 P2

Washington State Department of Transportation

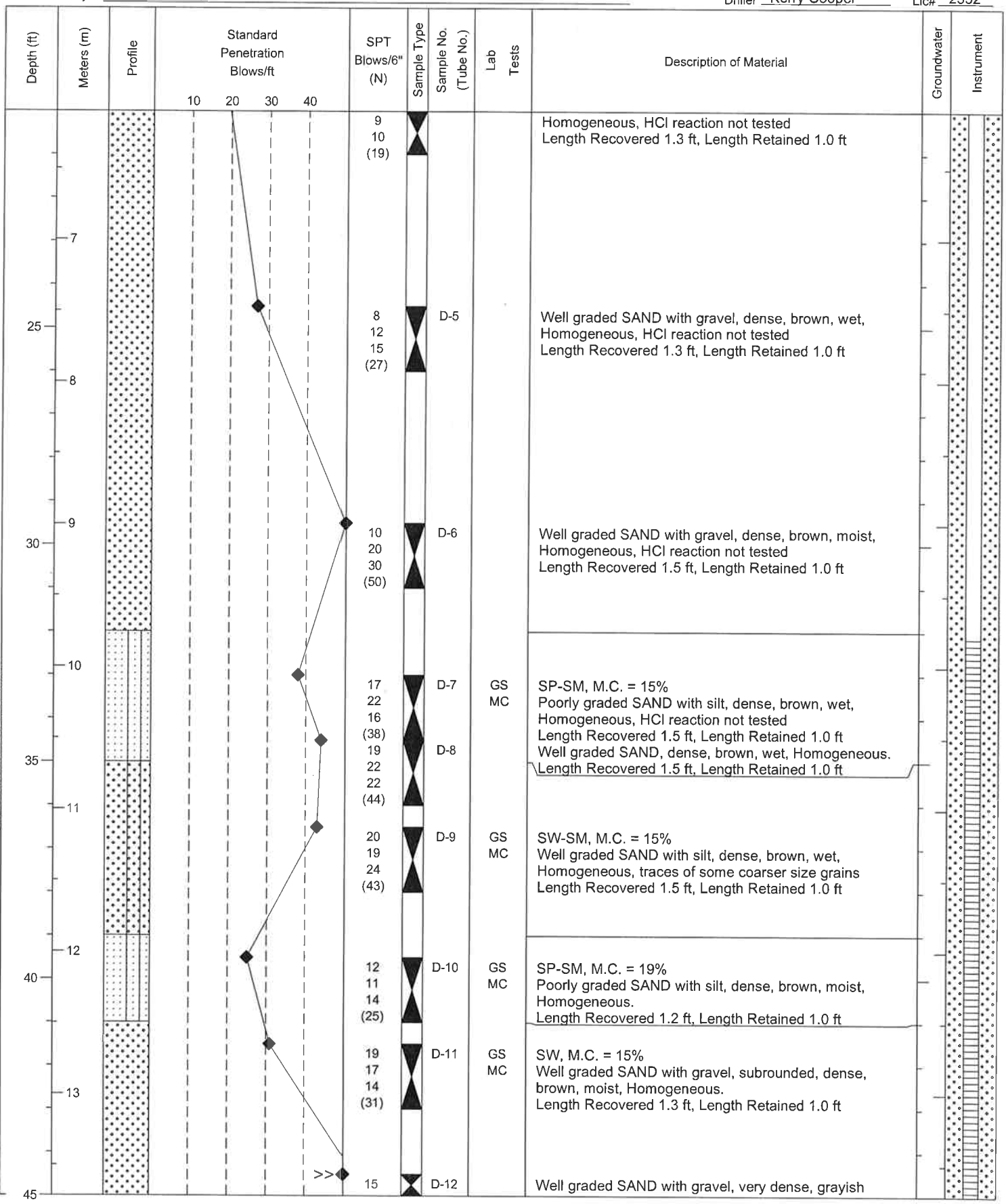
LOG OF TEST BORING

Start Card R 65924

Job No. XL-2201 SR 395 Elevation 1916.3 ft (584.1 m) HOLE No. PRY-3-04

Sheet 2 of 4

Project NSLAC - Perry, Market and Fairview Structures Driller Kerry Cooper Lic# 2552



SOIL ALL XL-2201 NSLAC - PERRY, MARKET AND FAIRVIEW STRUCTURES.GPJ SOIL.GDT 2/10/05 2:47:00 P2

Washington State Department of Transportation

LOG OF TEST BORING

Start Card R 65924

Job No. XL-2201 SR 395 Elevation 1916.3 ft (584.1 m) HOLE No. PRY-3-04

Sheet 3 of 4

Project NSLAC - Perry, Market and Fairview Structures Driller Kerry Cooper Lic# 2552

Depth (ft)	Meters (m)	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material
	14		17 36 (53)				brown, moist, Homogeneous. Length Recovered 1.5 ft, Length Retained 1.0 ft
		>>	23 23 28 (51)		D-13		Well graded SAND with gravel, very dense, grayish brown, moist, Homogeneous. Length Recovered 1.5 ft, Length Retained 1.0 ft
	15	>>	24 28 34 (62)		D-14		Well graded GRAVEL with sand, subrounded, very dense, grayish brown, moist, Homogeneous. Length Recovered 1.5 ft, Length Retained 1.0 ft
50	16						
		>>	55/6 (55)		D-15		Well graded GRAVEL with sand, subrounded, very dense, grayish brown, moist, Homogeneous. Length Recovered 0.2 ft, Length Retained 0.2 ft
55	17						
	18		20 20 30 (50)		D-16		Well graded SAND with gravel, dense, grayish brown, moist, Homogeneous. Length Recovered 1.5 ft, Length Retained 1.0 ft
60	19						
		>>	22 33 46 (79)		D-17		Well graded SAND with gravel, very dense, grayish brown, moist, Homogeneous. Length Recovered 1.5 ft, Length Retained 1.0 ft
65	20						
	21		28		D-18		Well graded SAND with gravel, dense, grayish brown,
70							

Groundwater / Instrument

SOIL ALL XL-2201 NSLAC - PERRY, MARKET AND FAIRVIEW STRUCTURES.GPJ SOIL.GDT 2/10/05 2:47:00 P2

Washington State Department of Transportation

LOG OF TEST BORING

Start Card R 65924

Job No. XL-2201 SR 395 Elevation 1916.3 ft (584.1 m)

HOLE No. PRY-3-04

Sheet 4 of 4

Project NSLAC - Perry, Market and Fairview Structures

Driller Kerry Cooper Lic# 2552

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				17 28 (45)				moist, Homogeneous. Length Recovered 1.5 ft, Length Retained 1.0 ft		
	22									
75	23		>>	20 28 32 (60)		D-19		Well graded SAND with gravel, very dense, grayish brown, moist, Homogeneous. Length Recovered 1.5 ft, Length Retained 1.0 ft		
	24							End of test hole boring at 76 ft below ground elevation. This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications and laboratory test data. (Water table in casing before bailing is 8.0', bailed hole to 72.0', after 51 minutes delay water table at 71.8'. Pulled all casing hole stayed open to 72.0', water table in hole at 48.2'. Installed piezo well at 52.0' with 20.0' screen. After 1 hour delay water table in piezo well is dry. Ended test hole at 76.0' below ground elevation. 9/30/04.		
80										
	25									
85	26									
	27									
90										
	28									
95										

SOIL ALL XL-2201 NSLAC - PERRY, MARKET AND FAIRVIEW STRUCTURES.GPJ SOIL.GDT 2/10/05 2:47:00 P2

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S 23736

Job No. XL-2201 SR 395 Elevation 1852.8 ft (564.7 m)

HOLE No. PRY-4-04

Sheet 1 of 4

Project NSLAC - Perry, Market and Fairview Structures

Driller Sean Verlo Lic# 2615

Site Address Vic. Perry st & proposed SR 395

Inspector Ybarra

Start December 28, 2004 Completion December 28, 2004 Well ID# Equipment CME 45 w/ autohammer

Station LR 514+02.03 Offset 46.06' Lt. Casing HW 4.5/HQ 3.5 Method Wet Rotary

Northing 631143.7736 Easting 2815221.779 Latitude Longitude

County Spokane Subsection NW 1/4 of the SW 1/4 Section 4 Range 45 EWM Township 26N

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
5	1									
10	2									
15	3									
20	4									
	5									
	6									

12/28/2004

SOIL ALL XL-2201 NSLAC - PERRY, MARKET AND FAIRVIEW STRUCTURES.GPJ SOIL.GDT 2/10/05,2:47:01 P2

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S 23736

Job No. XL-2201 SR 395 Elevation 1852.8 ft (564.7 m) HOLE No. PRY-4-04

Sheet 2 of 4

Project NSLAC - Perry, Market and Fairview Structures Driller Sean Verlo Lic# 2615

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
25	7									
	8									
30	9			16 18 18 (36)		D-1		Well graded SAND with gravel, angular, dense, gray, moist, Homogeneous. Length Recovered 1.5 ft, Length Retained 1.5 ft		
	10									
35	11			17 21 23 (44)		D-2		Well graded SAND with gravel, angular, Slightly silty, dense, gray, moist, Homogeneous. Length Recovered 1.5 ft, Length Retained 1.5 ft		
40	12			12 14 19 (33)		D-3		Well graded SAND with gravel, angular, Slightly silty, dense, gray, moist, Homogeneous. Length Recovered 1.0 ft, Length Retained 1.0 ft		
	13			19 21 20 (41)		D-4		Well graded SAND with gravel, angular, Slighlty silty, dense, gray, moist, Homogeneous. Length Recovered 1.5 ft, Length Retained 1.5 ft		
45				15 16		D-5		Well graded SAND with gravel, angular, Slightly silty, dense, gray, moist, Homogeneous.		

SOIL ALL XL-2201 NSLAC - PERRY, MARKET AND FAIRVIEW STRUCTURES.GPJ SOIL.GDT 2/10/05 2:47:01 P2

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S 23736

Job No. XL-2201 SR 395 Elevation 1852.8 ft (564.7 m) HOLE No. PRY-4-04

Sheet 3 of 4

Project NSLAC - Perry, Market and Fairview Structures Driller Sean Verlo Lic# 2615

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				17 (33)				Length Recovered 1.0 ft, Length Retained 1.0 ft		
	14									
				15 17 15 (32)		D-6		Well graded SAND with gravel, angular, Slightly silty, dense, gray, moist, Homogeneous. Length Recovered 1.3 ft, Length Retained 1.3 ft		
	15			16 18 17 (35)		D-7		Well graded SAND with gravel, angular, Slightly silty, dense, gray, moist, Homogeneous. Length Recovered 1.0 ft, Length Retained 1.0 ft		
50										
	16									
				14 15 19 (34)		D-8		Well graded SAND with gravel, subrounded, Slightly silty, dense, gray, moist, Homogeneous. Gravel as indicated by drilling process. Length Recovered 1.2 ft, Length Retained 1.2 ft		
55										
	17									
	18			14 14 16 (30)		D-9		Well graded SAND with gravel, subangular, Slightly silty, dense, gray, moist, Homogeneous, Large gravel as indicated by drilling process. Length Recovered 1.0 ft, Length Retained 1.0 ft		
60										
	19									
			>>	25 29 28 (57)		D-10		Well graded SAND with gravel, angular, Slightly silty, very dense, gray, moist, Homogeneous. Length Recovered 1.2 ft, Length Retained 1.2 ft		
65										
	20									
	21		>>	26 31		D-11		Well graded SAND with gravel, angular, Slightly silty, very dense, gray, moist, Homogeneous.		
70										

SOIL ALL XL-2201 NSLAC - PERRY, MARKET AND FAIRVIEW STRUCTURES.GPJ SOIL.GDT 2/10/05,2:47:01 P2

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S 23736

Job No. XL-2201 SR 395 Elevation 1852.8 ft (564.7 m) HOLE No. PRY-4-04

Sheet 4 of 4

Project NSLAC - Perry, Market and Fairview Structures Driller Sean Verlo Lic# 2615

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				35 (66)				Length Recovered 1.0 ft, Length Retained 1.0 ft		
	22									
			>>	36 43 50/3 (93)		D-12		No Recovery		
75	23									
								End of test hole boring at 75.3 ft below ground elevation. This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications and laboratory test data.		
	24									
80										
	25									
85	26									
	27									
90										
	28									
95										

SOIL ALL XL-2201 NSLAC - PERRY, MARKET AND FAIRVIEW STRUCTURES.GPJ SOIL.GDT 2/10/05 2:47:01 P2

APPENDIX C - LABORATORY TESTING

LABORATORY TESTING

Laboratory testing was performed on selected samples from the field exploration program. Testing included performing moisture content, grain size analyses and Atterberg Limits. The tests were done in general accordance with AASHTO T-88, T-89, and T-90 guide specifications, respectively. After the testing was complete, the samples were classified in general accordance with the Unified Soil Classification System (USCS).

Job No. **XL-2201** Date **April 13, 2005**

Hole No. **FV-1-04** Sheet **1** of **1**

Project **NSLAC - Perry, Market and Fairview Structures**

Laboratory Summary

Washington State Department of Transportation

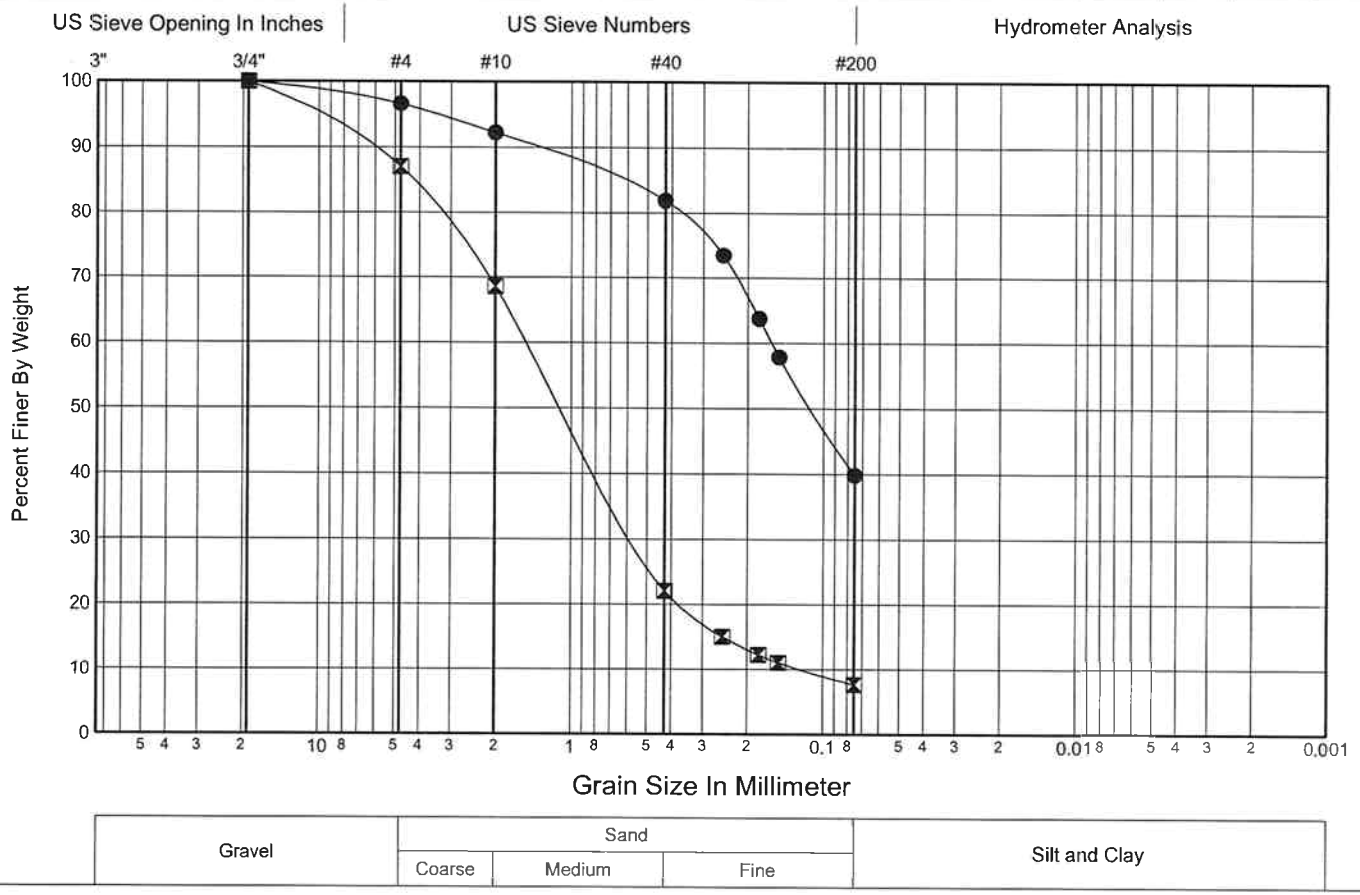
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	5.0	1.52	D-1	SM	See Boring Log	SILTY SAND	15			
☒	15.0	4.57	D-3	SW-SM	See Boring Log	WELL-GRADED SAND with SILT	11			

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cc	Cu
●	3.4	56.8	39.8		
☒	13.0	79.4	7.6	1.7	12.4

GRADATION VALUES

	D60	D50	D30	D20	D10
●	0.160	0.11			
☒	1.504	1.08	0.55	0.36	0.121



Job No. **XL-2201** Date **April 13, 2005**

Hole No. **FV-2-04** Sheet **1** of **1**

Project **NSLAC - Perry, Market and Fairview Structures**

Laboratory Summary

Washington State Department of Transportation

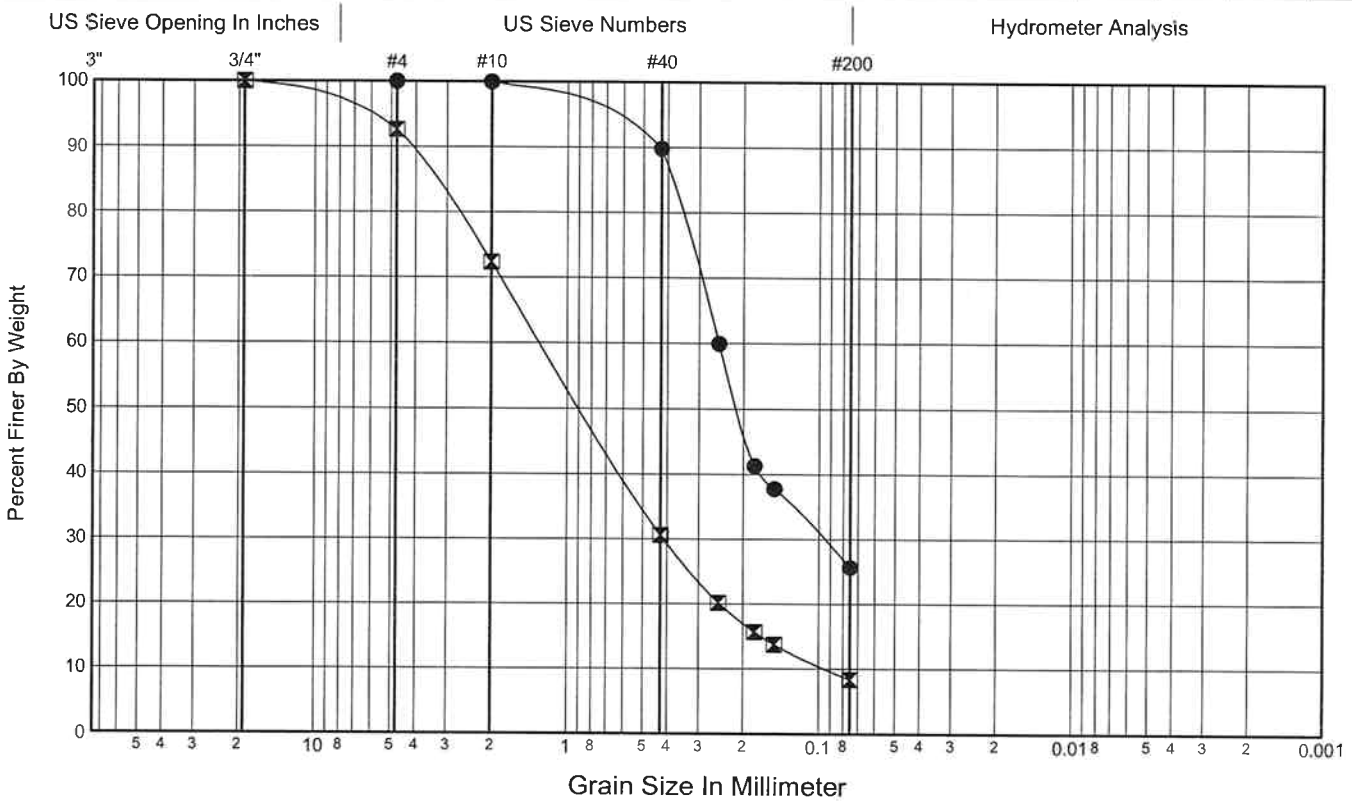
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	3.0	0.91	D-1	SM	See Boring Log	SILTY SAND	22			
⊠	8.0	2.44	D-2	SW-SM	See Boring Log	WELL-GRADED SAND with SILT	18			

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cc	Cu
●	0.0	74.4	25.6		
⊠	7.3	84.3	8.3	1.4	13.6

GRADATION VALUES

	D60	D50	D30	D20	D10
●	0.250	0.21	0.10		
⊠	1.266	0.87	0.41	0.25	0.093



Job No. **XL-2201** Date **April 13, 2005**

Hole No. **FV-4-04** Sheet **1** of **1**

Project **NSLAC - Perry, Market and Fairview Structures**

Laboratory Summary

Washington State Department of Transportation

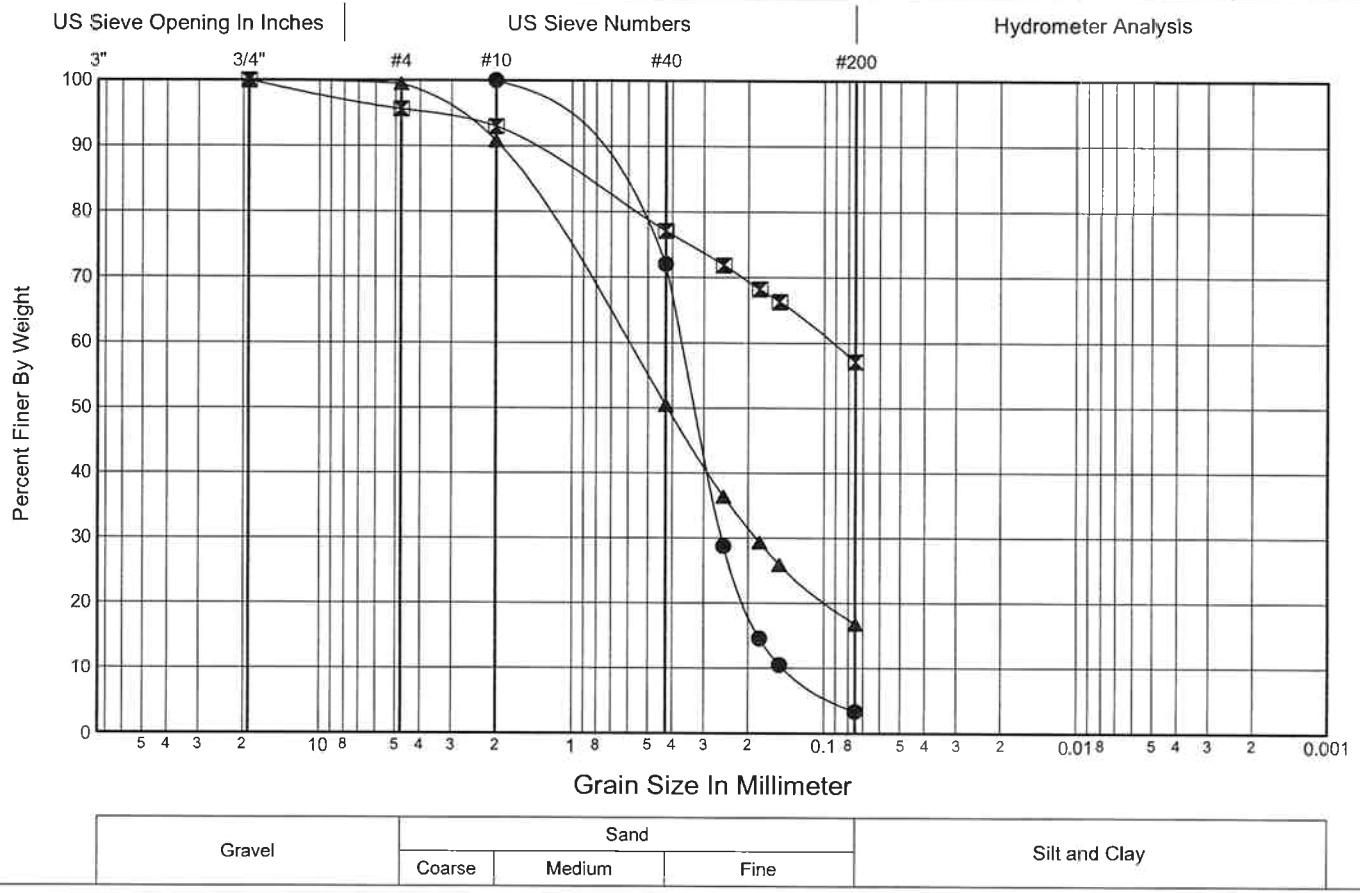
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	5.0	1.52	D-1	SP		POORLY GRADED SAND	22			
⊠	10.0	3.05	D-2	ML		SANDY SILT	16			
▲	15.0	4.57	D-4	SM		SILTY SAND	15			

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cc	Cu
●	0.0	96.7	3.3	1.2	2.6
⊠	4.4	38.5	57.1		
▲	0.5	82.8	16.7		

GRADATION VALUES

	D60	D50	D30	D20	D10
●	0.367	0.32	0.25	0.20	0.143
⊠	0.093				
▲	0.614	0.42	0.19	0.10	



Job No. **XL-2201** Date **April 13, 2005**

Hole No. **MRK-1-00** Sheet **1** of **1**

Project **NSLAC - Perry, Market and Fairview Structures**

Laboratory Summary

Washington State Department of Transportation

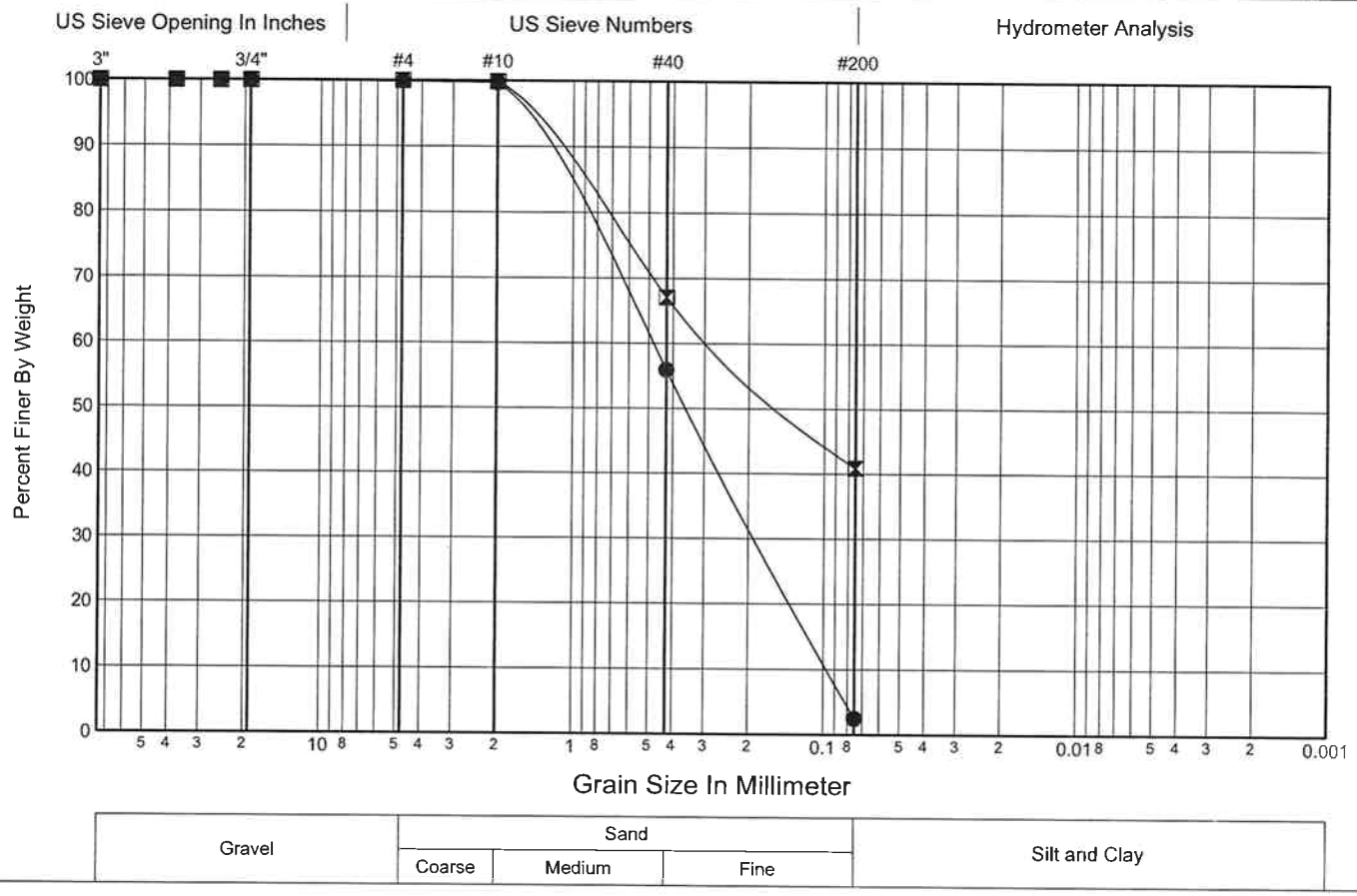
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	20.0	6.10	D-4	SP	See Boring Log	POORLY GRADED SAND	16			
⊠	30.0	9.14	D-6	SM	See Boring Log	SILTY SAND	25			

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cc	Cu
●	0.1	97.4	2.5	0.7	5.1
⊠	0.0	59.1	40.9		

GRADATION VALUES

	D60	D50	D30	D20	D10
●	0.492	0.35	0.18	0.13	0.096
⊠	0.266	0.14			



Job No. **XL-2201** Date **April 13, 2005**

Hole No. **MRK-2-04** Sheet **1** of **1**

Project **NSLAC - Perry, Market and Fairview Structures**

Laboratory Summary

Washington State Department of Transportation

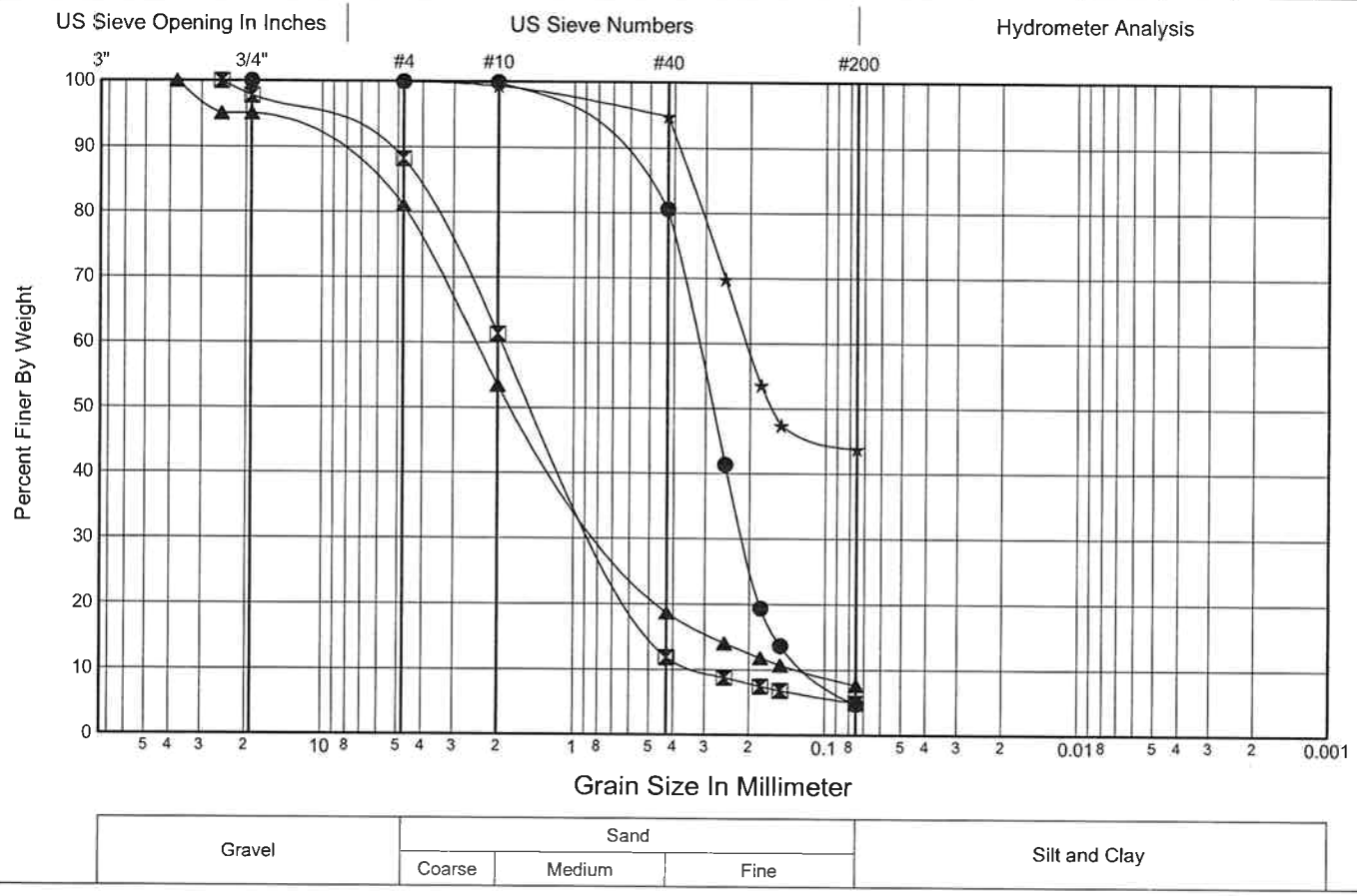
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	9.0	2.74	D-2	SP		POORLY GRADED SAND	4			
⊠	34.0	10.36	D-7	SP		POORLY GRADED SAND	14			
▲	59.0	17.98	D-12	SW-SM		WELL-GRADED SAND with SILT and GRAVEL	13			
★	79.0	24.08	D-16	SC		CLAYEY SAND	22	33	23	10

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cc	Cu
●	0.1	95.3	4.7	1.2	2.8
⊠	11.8	83.3	4.9	0.9	6.2
▲	19.0	73.4	7.6	1.6	19.2
★	0.0	56.2	43.8		

GRADATION VALUES

	D60	D50	D30	D20	D10
●	0.322	0.28	0.21	0.18	0.113
⊠	1.919	1.40	0.75	0.55	0.309
▲	2.457	1.72	0.70	0.45	0.128
★	0.205	0.16			



Job No. **XL-2201** Date **April 13, 2005**

Hole No. **MRK-3-04** Sheet **1** of **1**

Project **NSLAC - Perry, Market and Fairview Structures**

Laboratory Summary

Washington State Department of Transportation

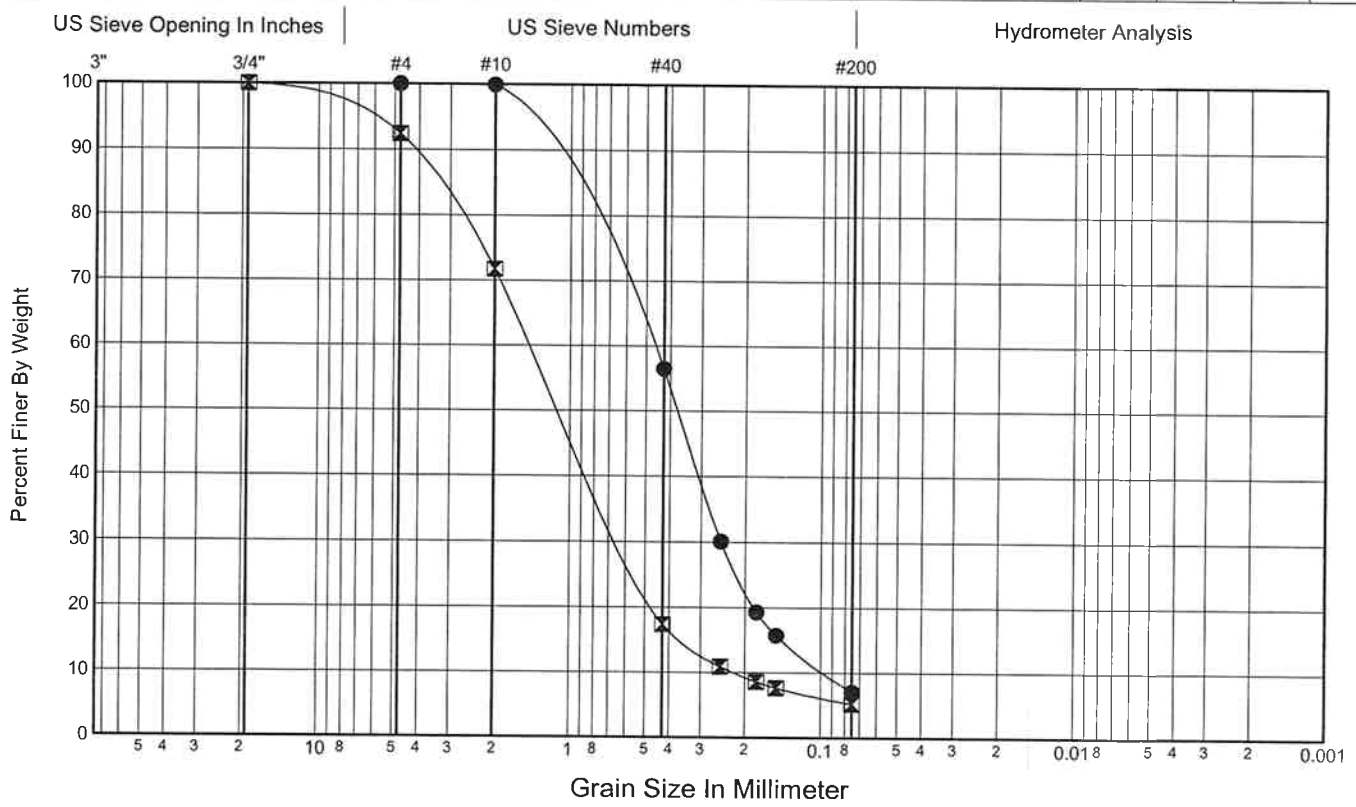
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	20.0	6.10	D-4	SP-SM		POORLY GRADED SAND with SILT	15			
⊠	65.0	19.81	D-13	SW-SM		WELL-GRADED SAND with SILT	13			

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cc	Cu
●	0.0	93.0	7.0	1.4	5.1
⊠	7.6	87.2	5.2	1.2	6.5

GRADATION VALUES

	D60	D50	D30	D20	D10
●	0.483	0.37	0.25	0.18	0.095
⊠	1.432	1.08	0.61	0.46	0.221



Job No. **XL-2201** Date **April 13, 2005**

Hole No. **MRK-4-04** Sheet **1** of **1**

Project **NSLAC - Perry, Market and Fairview Structures**

Laboratory Summary

Washington State Department of Transportation

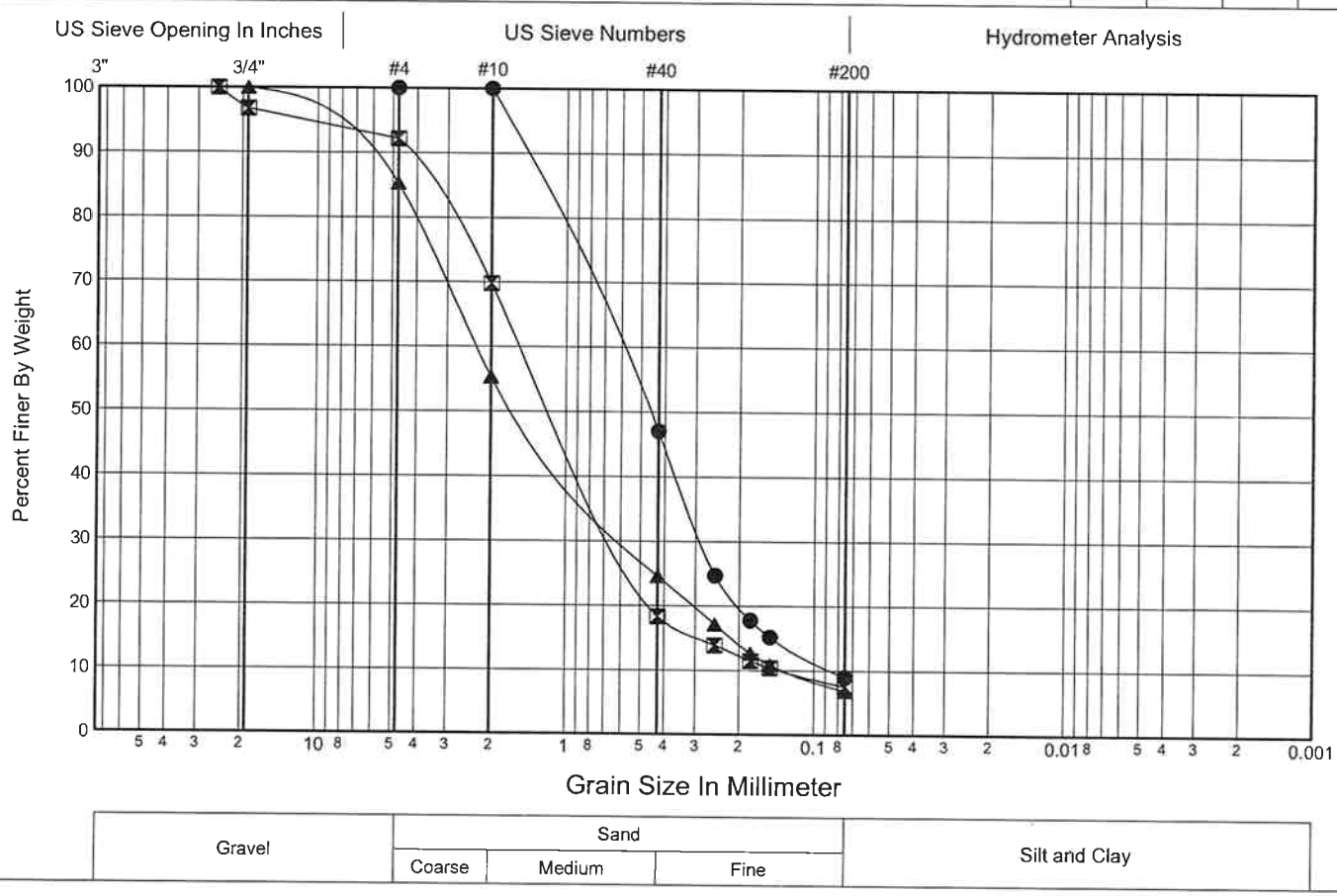
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	34.0	10.36	D-7	SW-SM		WELL-GRADED SAND with SILT	14			
⊠	39.0	11.89	D-8	SW-SM		WELL-GRADED SAND with SILT	9			
▲	79.0	24.08	D-16	SW-SM		WELL-GRADED SAND with SILT	10			

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cc	Cu
●	0.0	91.0	9.0	1.5	7.4
⊠	7.8	84.6	7.5	1.8	11.0
▲	14.7	78.4	6.8	1.1	17.7

GRADATION VALUES

	D60	D50	D30	D20	D10
●	0.622	0.46	0.28	0.20	0.084
⊠	1.490	1.10	0.60	0.45	0.136
▲	2.293	1.54	0.56	0.31	0.129



Job No. **XL-2201** Date **April 13, 2005**

Hole No. **PRK-7-04** Sheet **1** of **1**

Project **NSLAC - Parksmith Structures**

Laboratory Summary

Washington State Department of Transportation

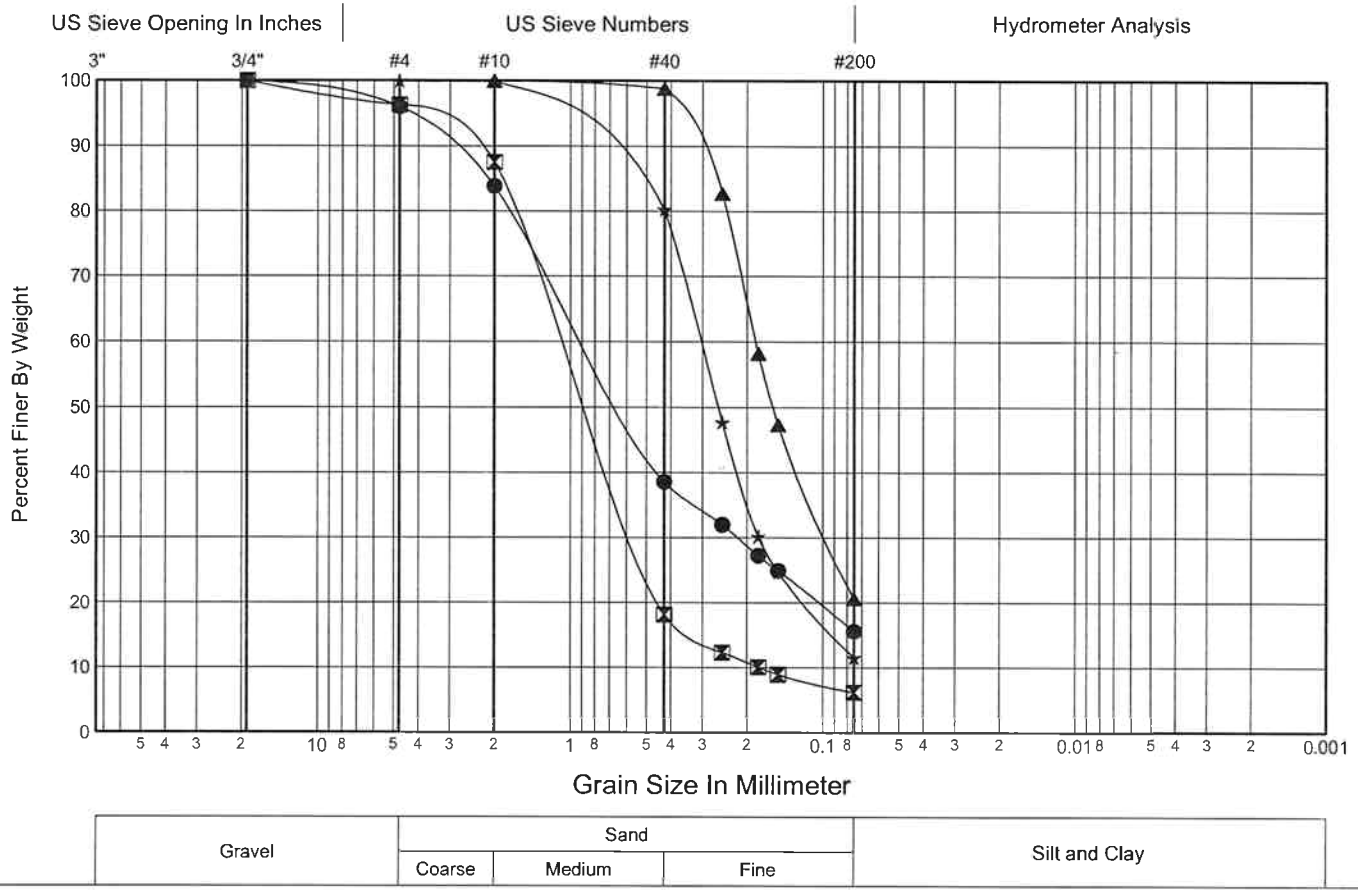
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	9.0	2.74	D-2	SM		SILTY SAND	11			
⊠	14.0	4.27	D-3	SW-SM		WELL-GRADED SAND with SILT	16			
▲	24.0	7.32	D-5	SM		SILTY SAND	26			
★	39.0	11.89	D-8	SP-SM		POORLY GRADED SAND with SILT	22			

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cc	Cu
●	4.0	80.5	15.5		
⊠	3.7	90.2	6.2	1.6	6.1
▲	0.0	79.4	20.6		
★	0.1	88.4	11.5	1.5	4.4

GRADATION VALUES

	D60	D50	D30	D20	D10
●	0.886	0.63	0.22	0.10	
⊠	1.082	0.87	0.55	0.44	0.179
▲	0.184	0.16	0.10		
★	0.306	0.26	0.18	0.12	



Job No. **XL-2201** Date **April 13, 2005**

Hole No. **PRK-8-04** Sheet **1** of **2**

Project **NSLAC - Parksmith Structures**

Laboratory Summary

Washington State Department of Transportation

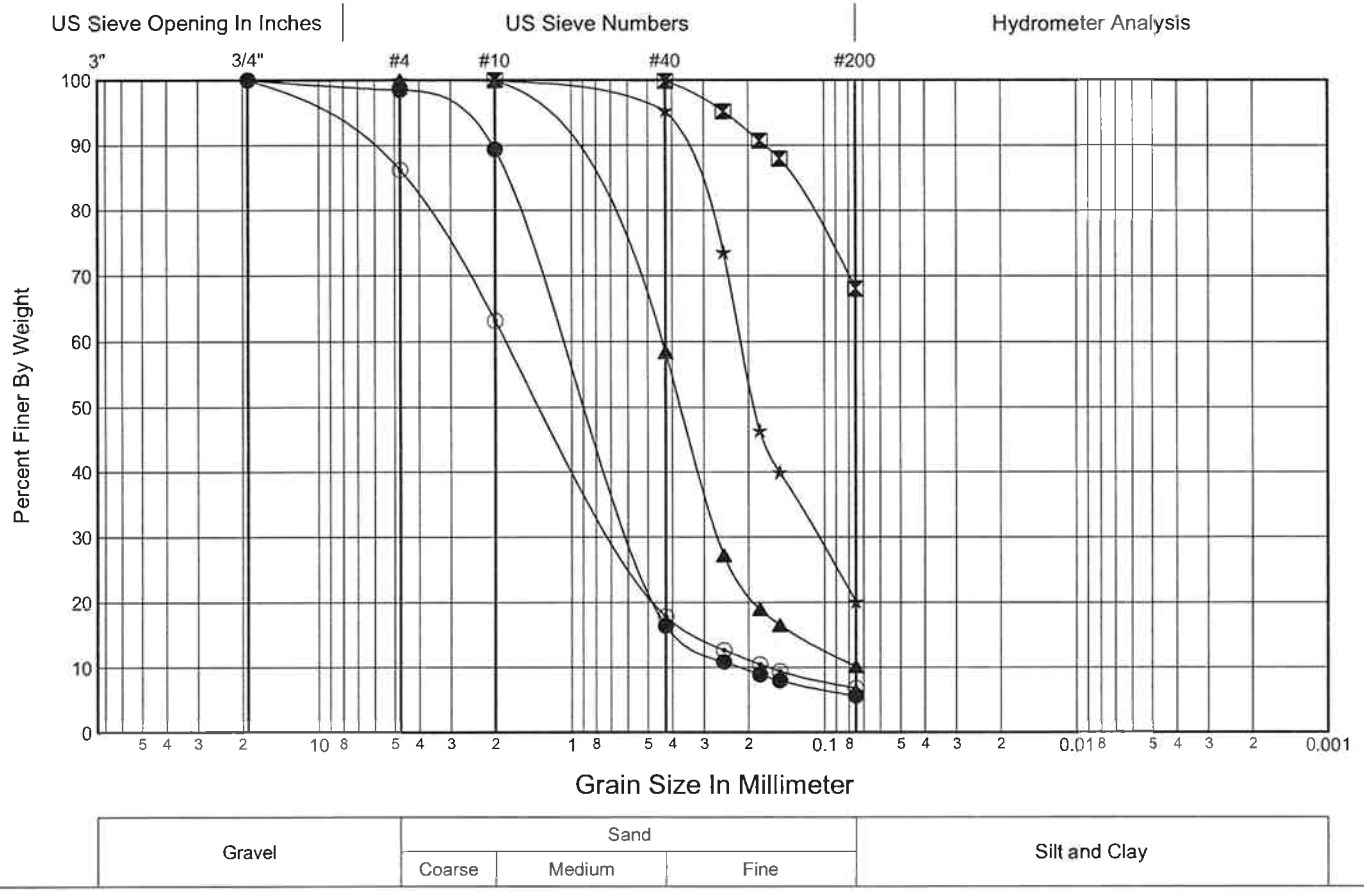
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	4.0	1.22	D-1	SP-SM		POORLY GRADED SAND with SILT	15			
⊠	14.0	4.27	D-3	ML		SANDY SILT	32			
▲	24.0	7.32	D-5	SW-SM		WELL-GRADED SAND with SILT	14			
★	29.0	8.84	D-6	SM		SILTY SAND	20			
⊙	49.0	14.94	D-10	SW-SM		WELL-GRADED SAND with SILT	12			

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cc	Cu
●	1.5	92.9	5.6	1.4	4.9
⊠	0.0	31.9	68.1		
▲	0.0	89.9	10.1	2.1	6.1
★	0.0	79.9	20.1		
⊙	13.8	79.4	6.8	1.4	10.7

GRADATION VALUES

	D60	D50	D30	D20	D10
●	1.074	0.87	0.57	0.46	0.219
⊠					
▲	0.450	0.37	0.26	0.19	
★	0.212	0.19	0.11		
⊙	1.796	1.28	0.64	0.46	0.167



Job No. **XL-2201** Date **April 13, 2005**

Hole No. **PRK-8-04** Sheet **2** of **2**

Project **NSLAC - Parksmith Structures**

Laboratory Summary

Washington State Department of Transportation

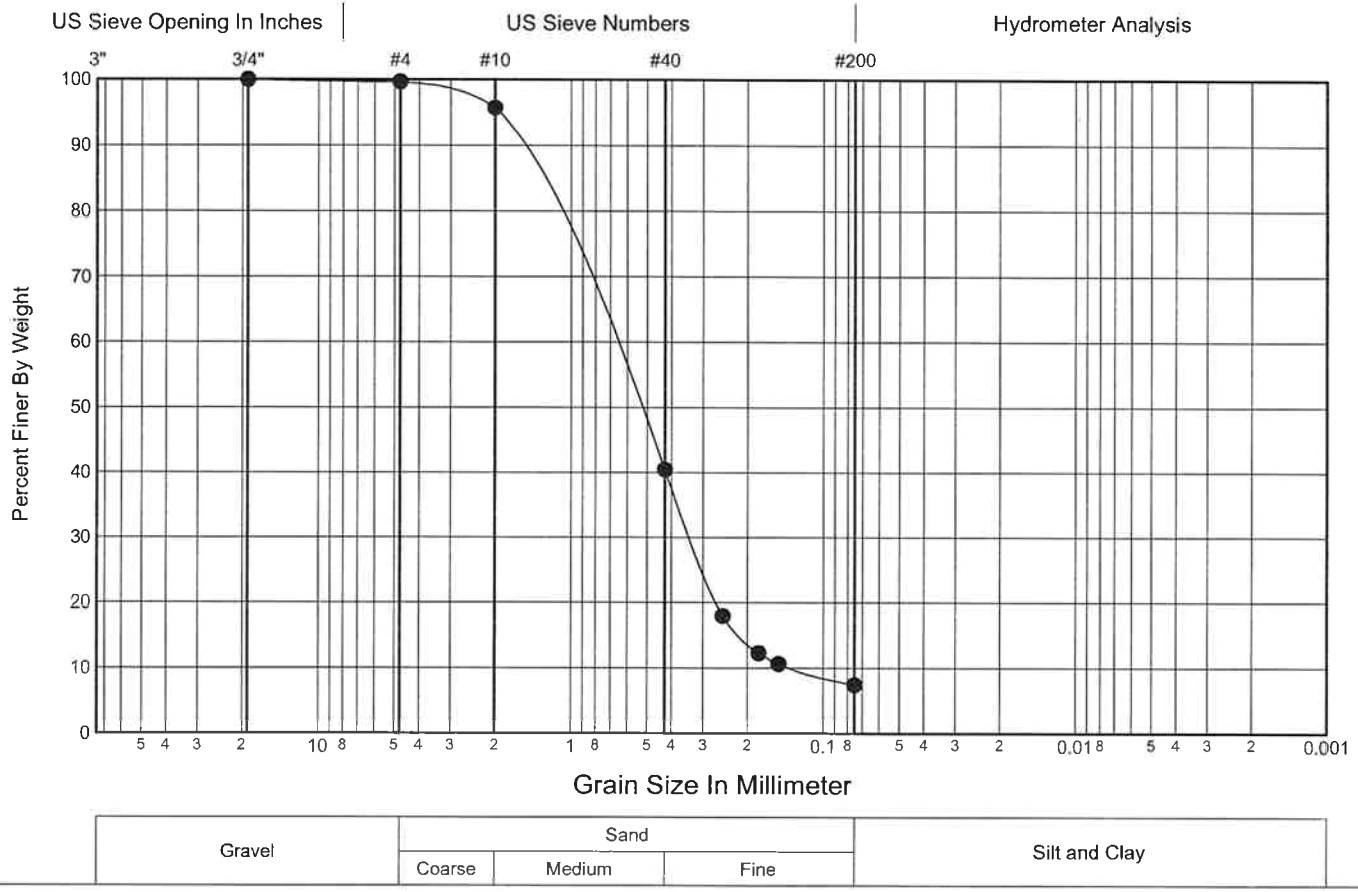
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	84.0	25.60	D-17	SP-SM		POORLY GRADED SAND with SILT	15			

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cc	Cu
●	0.3	92.3	7.4	1.1	5.6

GRADATION VALUES

	D60	D50	D30	D20	D10
●	0.736	0.56	0.33	0.26	0.131



Job No. **XL-2201** Date **April 13, 2005**

Hole No. **PRK-9-04** Sheet **1** of **1**

Project **NSLAC - Parksmith Structures**

Laboratory Summary

Washington State Department of Transportation

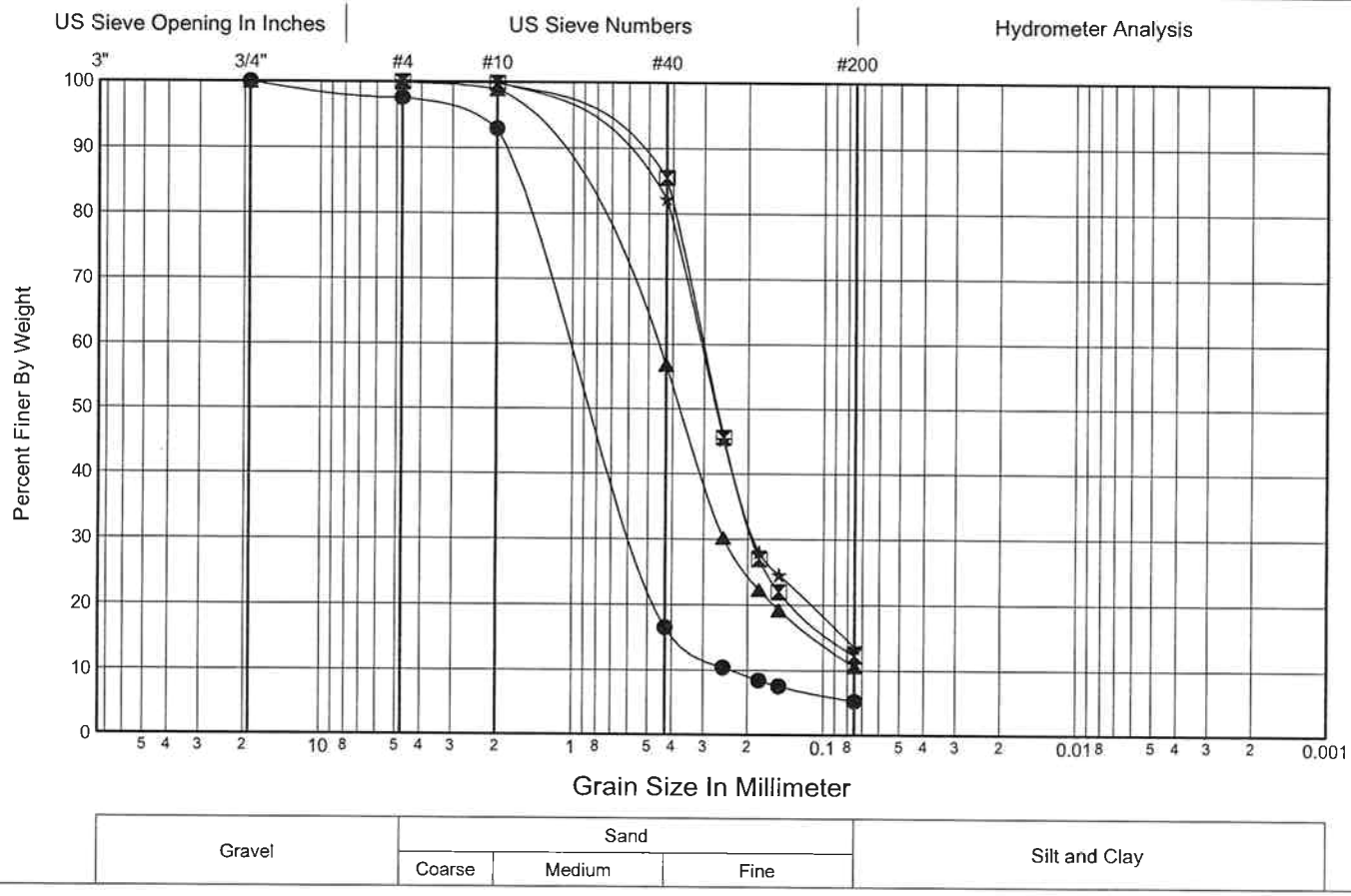
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	9.0	2.74	D-2	SP-SM		POORLY GRADED SAND with SILT	20			
⊠	14.0	4.27	D-3	SM		SILTY SAND	15			
▲	19.0	5.79	D-4	SW-SM		WELL-GRADED SAND with SILT	20			
★	34.0	10.36	D-7	SM		SILTY SAND	21			

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cc	Cu
●	2.4	92.3	5.3	1.3	4.4
⊠	0.0	87.8	12.2	1.9	4.7
▲	0.1	89.3	10.6	1.8	6.7
★	0.0	86.5	13.5		

GRADATION VALUES

	D60	D50	D30	D20	D10
●	1.027	0.84	0.56	0.46	0.234
⊠	0.303	0.27	0.19	0.13	
▲	0.479	0.37	0.25	0.16	
★	0.309	0.27	0.19	0.11	



Job No. **XL-2201** Date **April 13, 2005**

Hole No. **PRY-1-00** Sheet **1** of **1**

Project **NSLAC - Perry, Market and Fairview Structures**

Laboratory Summary

Washington State Department of Transportation

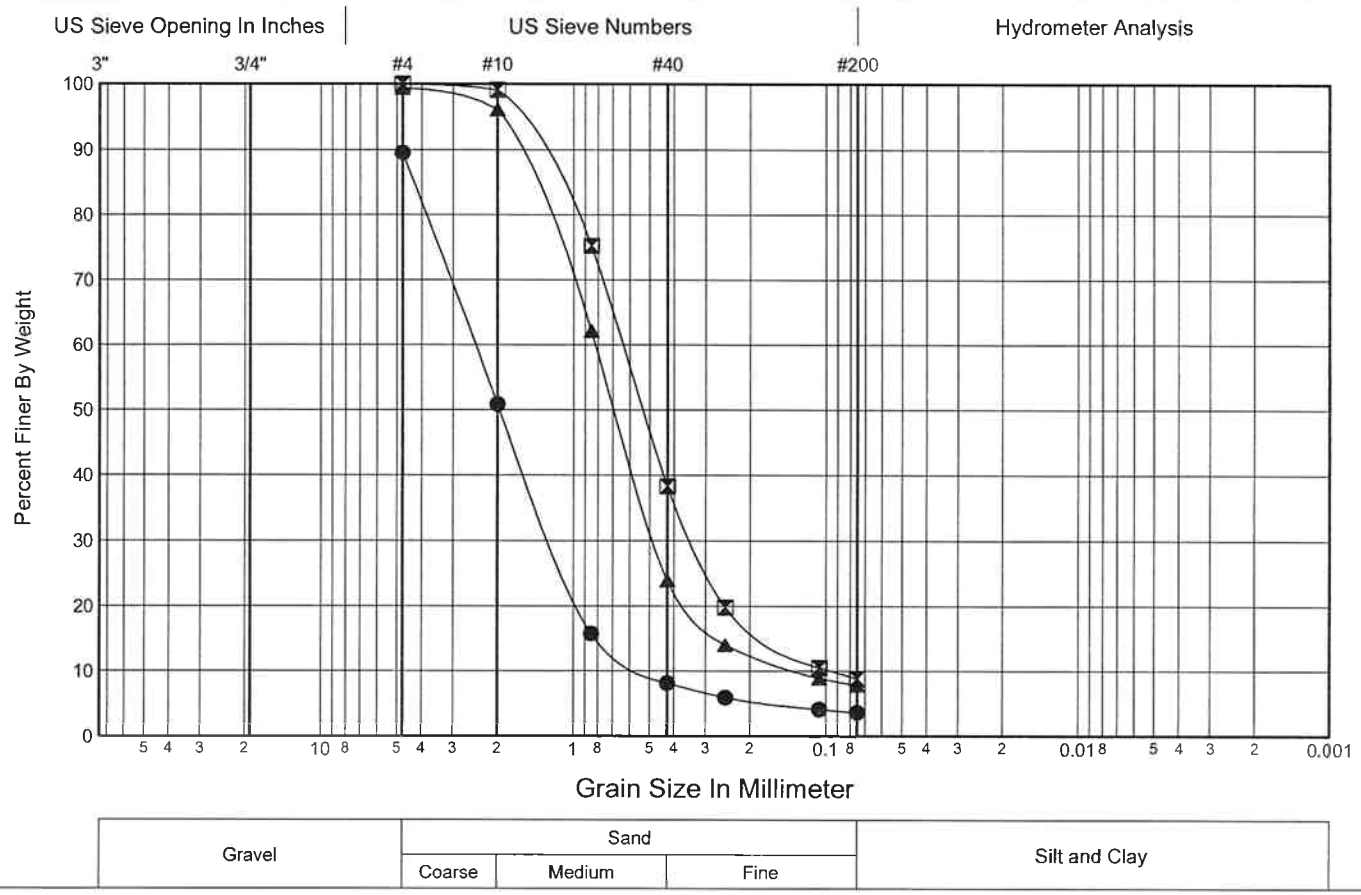
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	9.5	2.90		SP		POORLY GRADED SAND Poorly graded SAND				
⊠	24.5	7.47				Well graded SAND				
▲	34.5	10.52				Poorly graded SAND				

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cc	Cu
●	0.0	85.9	3.6	1.2	4.9
⊠	0.0	91.2	8.8	1.8	6.7
▲	0.0	91.6	7.8	2.2	6.4

GRADATION VALUES

	D60	D50	D30	D20	D10
●	2.457	1.96	1.20	0.94	0.505
⊠	0.639	0.53	0.33	0.25	0.096
▲	0.818	0.68	0.47	0.34	0.128



Job No. **XL-2201** Date **April 13, 2005**

Hole No. **PRY-2-04** Sheet **1** of **2**

Project **NSLAC - Perry, Market and Fairview Structures**

Laboratory Summary

Washington State Department of Transportation

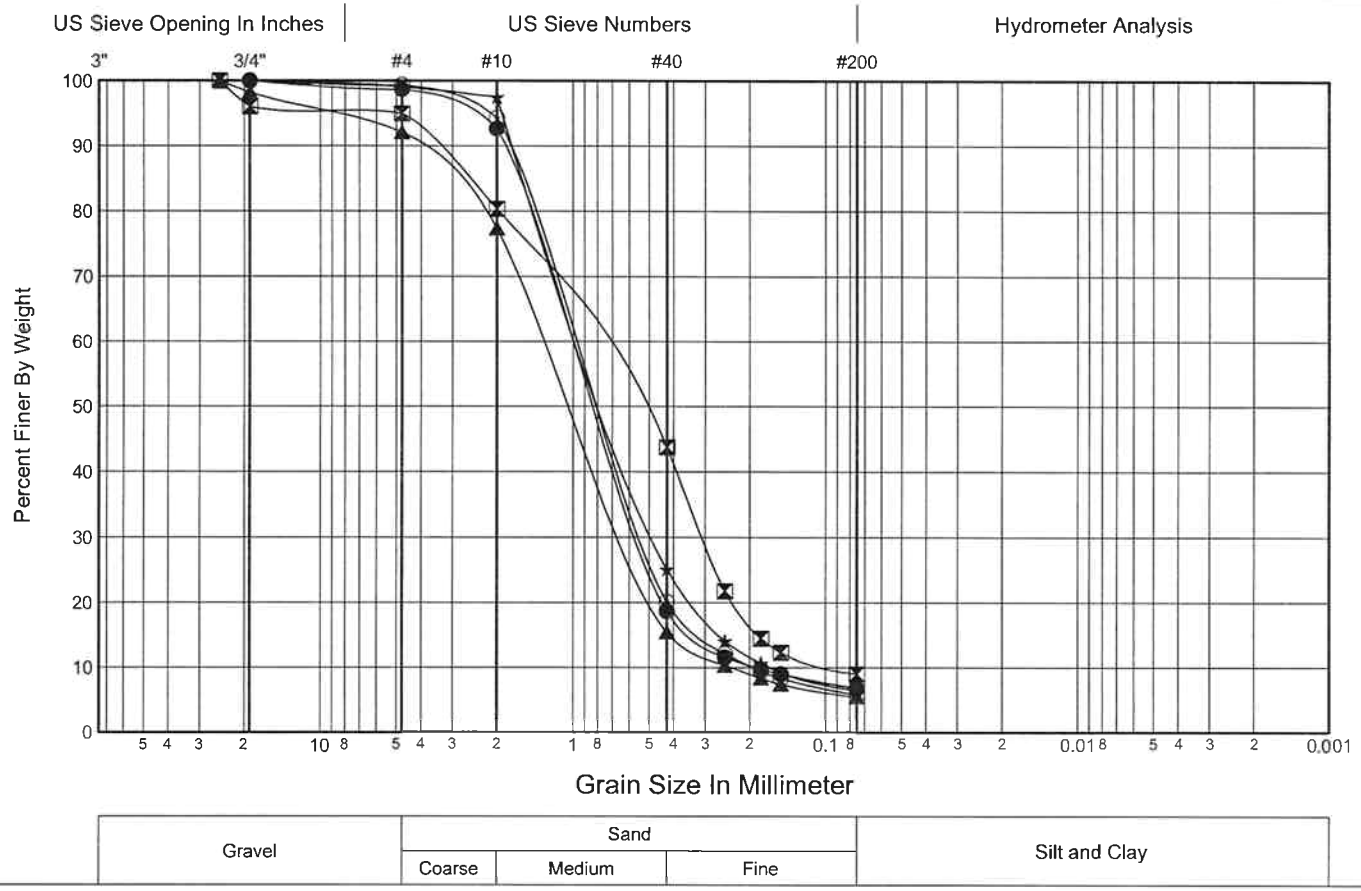
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	10.0	3.05	D-2	SP-SM		POORLY GRADED SAND with SILT	13			
⊠	20.0	6.10	D-4	SW-SM		WELL-GRADED SAND with SILT	10			
▲	23.0	7.01	D-5	SP-SM		POORLY GRADED SAND with SILT	10			
★	28.0	8.53	D-7	SP-SM		POORLY GRADED SAND with SILT	19			
⊙	30.0	9.14	D-8	SP-SM		POORLY GRADED SAND with SILT	17			

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cc	Cu
●	1.3	91.9	6.8	1.5	5.4
⊠	5.0	86.0	9.0	1.2	9.1
▲	8.0	86.6	5.4	1.2	5.5
★	0.9	92.6	6.4	1.5	5.4
⊙	0.7	93.6	5.7	1.4	5.0

GRADATION VALUES

	D60	D50	D30	D20	D10
●	1.010	0.82	0.54	0.44	0.188
⊠	0.847	0.55	0.31	0.23	0.093
▲	1.298	1.01	0.61	0.48	0.238
★	0.897	0.72	0.47	0.33	0.166
⊙	0.978	0.79	0.52	0.42	0.194



Job No. **XL-2201** Date **April 13, 2005**

Hole No. **PRY-2-04** Sheet **2** of **2**

Project **NSLAC - Perry, Market and Fairview Structures**

Laboratory Summary

Washington State Department of Transportation

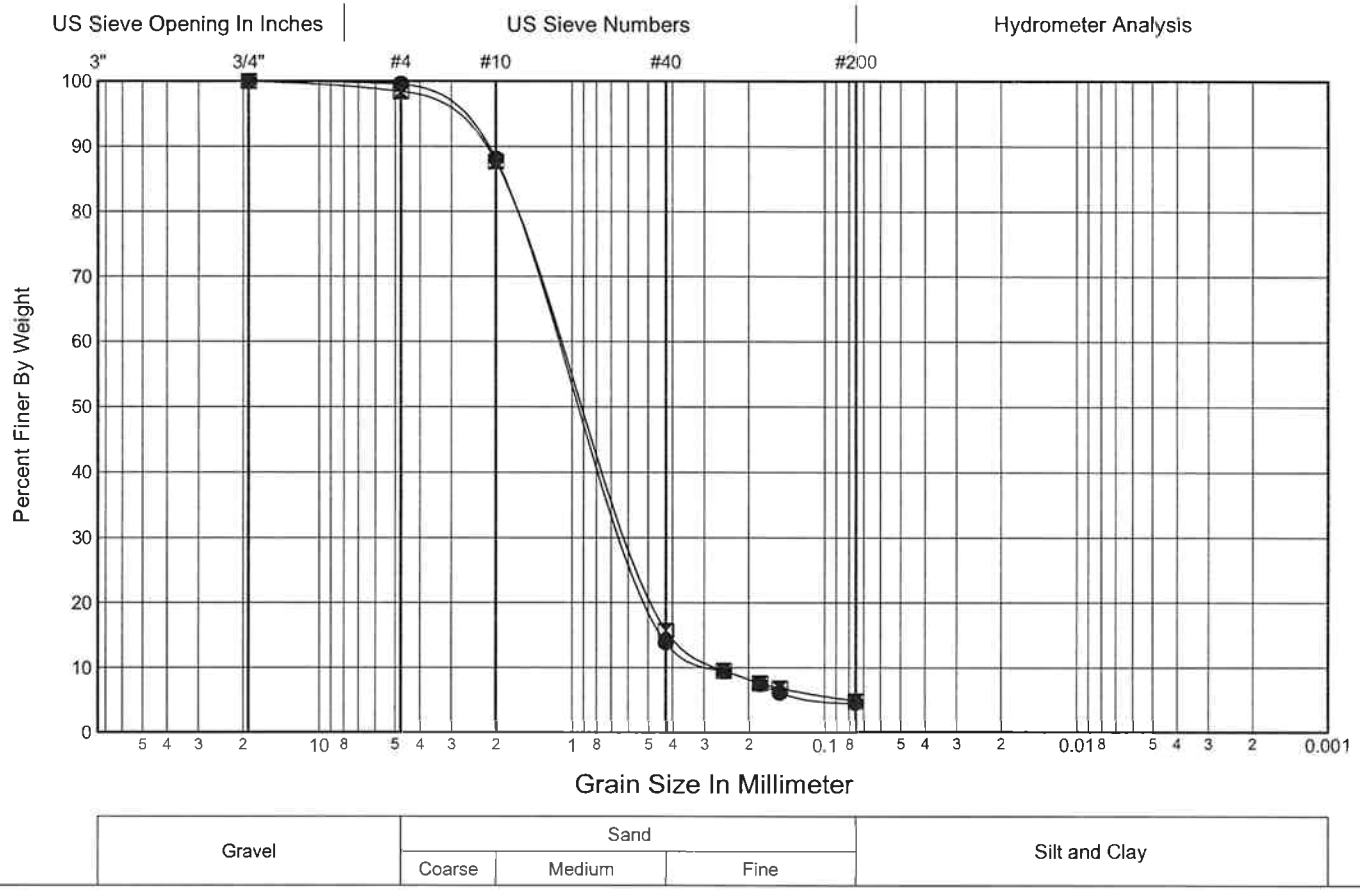
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	33.0	10.06	D-9	SP		POORLY GRADED SAND	18			
⊠	38.0	11.58	D-11	SP		POORLY GRADED SAND	16			

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cc	Cu
●	0.4	95.1	4.5	1.2	4.1
⊠	1.6	93.6	4.8	1.2	4.2

GRADATION VALUES

	D60	D50	D30	D20	D10
●	1.113	0.90	0.60	0.48	0.269
⊠	1.103	0.89	0.58	0.47	0.261



Job No. **XL-2201** Date **April 13, 2005**

Hole No. **PRY-3-04** Sheet **1** of **1**

Project **NSLAC - Perry, Market and Fairview Structures**

Laboratory Summary

Washington State Department of Transportation

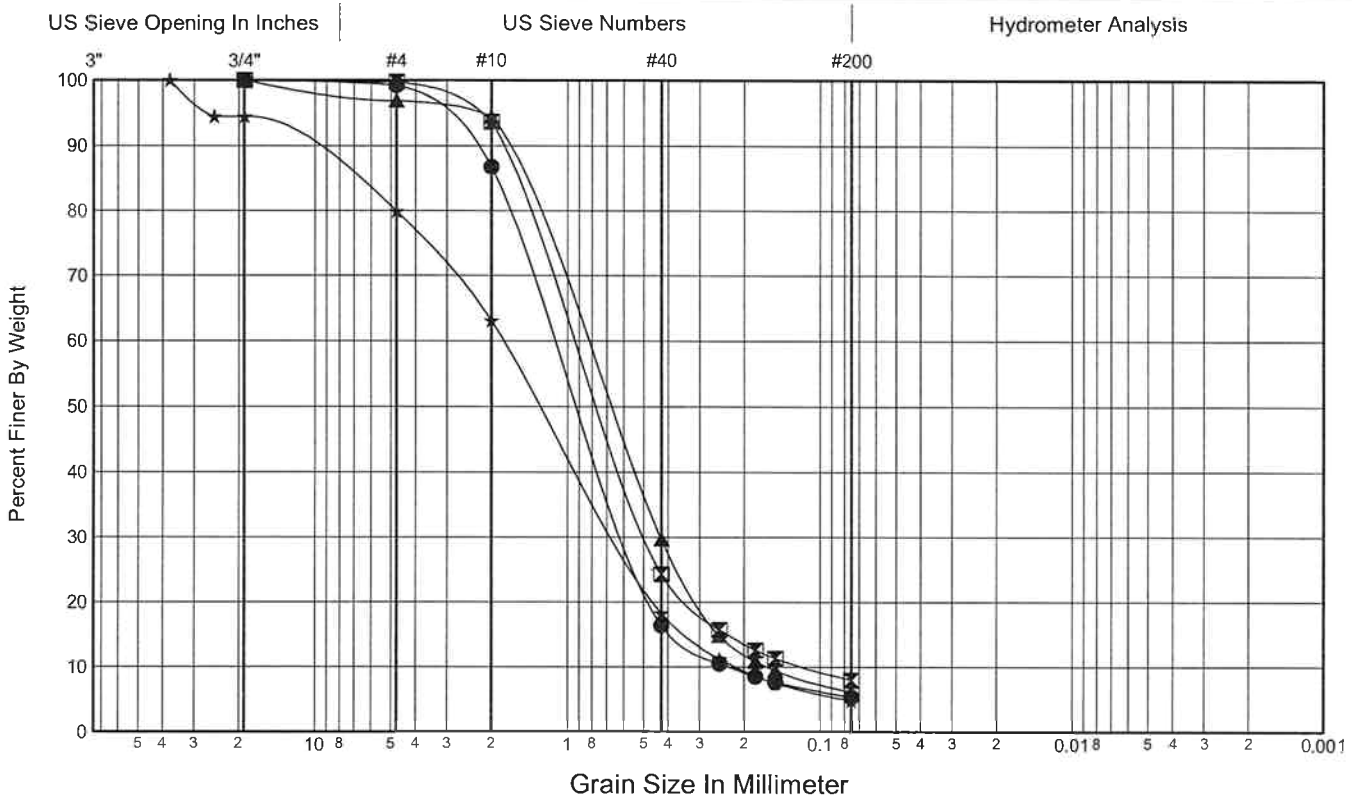
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	33.0	10.06	D-7	SP-SM		POORLY GRADED SAND with SILT	15			
⊠	36.5	11.13	D-9	SW-SM		WELL-GRADED SAND with SILT	15			
▲	39.5	12.04	D-10	SP-SM		POORLY GRADED SAND with SILT	19			
★	41.5	12.65	D-11	SW		WELL-GRADED SAND with GRAVEL	15			

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cc	Cu
●	0.8	93.9	5.3	1.3	4.8
⊠	0.2	91.8	8.0	2.2	8.2
▲	3.1	90.8	6.1	1.3	5.4
★	20.1	75.1	4.8	1.1	8.4

GRADATION VALUES

	D60	D50	D30	D20	D10
●	1.111	0.89	0.57	0.46	0.231
⊠	0.944	0.76	0.48	0.33	0.115
▲	0.879	0.69	0.43	0.30	0.162
★	1.799	1.27	0.64	0.45	0.215



APPENDIX D – ROCK CORE PHOTOS


XL-2201
FV-3-04
F-5710
25.3'-31'


XL-2201
FV-3-04
F-5710
31'-46'


XL-2201
FV-3-04
F-5710
46'-50.5'


XL-2201
FV-4-04
XL-5711
11.5'-20'


XL-2201
FV-4-04
F-5711
20.5'-35'


XL-2201
FV-4-04
F-5711
35.5'-45'


XL-2201
FV-4-04
F-5711
45.2'-50'

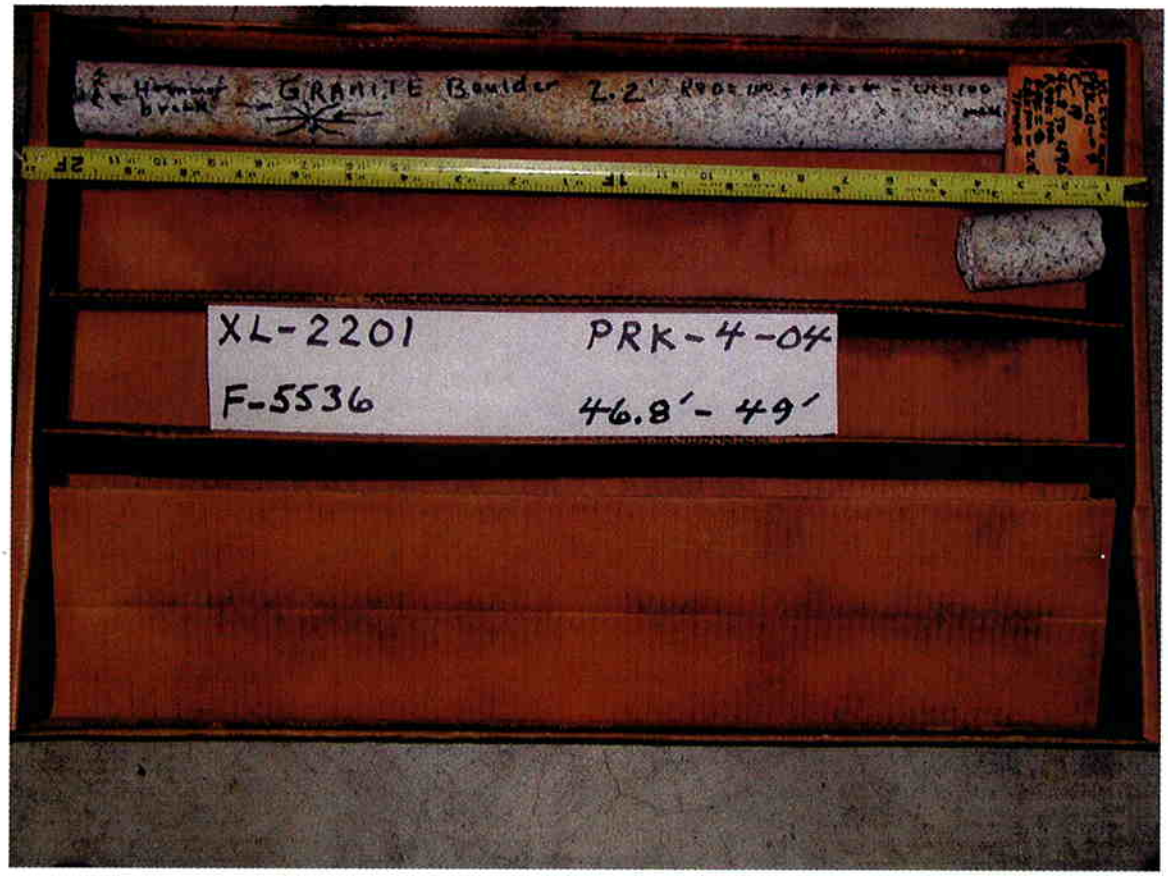

XL-2201
FV-4-04
F-5711
50.5' - 60'


XL-2201
FV-4-04
F-5711
60.2' - 70'


XL-2201
F-5711
FV-4-04
70'-75'


XL-2201
FV-5-04
F-5721
26.3'-36'


XL-2201
FV-5-04
F-5721
36'-41'


GRANITE Boulder
XL-2201
PRK-4-04
F-5536
46.8'- 49'

APPENDIX E – BRIDGE FOUNDATION DESIGN INFORMATION

SR 395 Northbound Overcrossing at Fairview Road

Pier 1 Bearing Capacity

Maximum Footing Elevation: 2056'

Soils at Pier 1 should be excavated to the bedrock and replaced with Gravel Borrow, Method C compaction, to elevation 2056'. If bedrock is encountered at or above the footing elevation, the rock should be removed to 1 foot below the footing elevation and replaced with Gravel Borrow, Method C compaction.

Footing Width (ft)	Ultimate Bearing Capacity (ksf)	Service Bearing Capacity (ksf) Based on 1" of Settlement*
6	58.4	23.0
9	71.3	17.5
12	94.3	14.7
15	97.0	13.5
18	109.3	12.2
21	121.1	11.5

* Due to difference in elevation of bedrock, the service limit state bearing capacity is based on 1 inch of settlement at the west side of the abutment and 3/8 of an inch at the east side of the abutment.

Pier 2 Bearing Capacity

Maximum Footing Elevation : 2050'

Footing Width (ft)	Ultimate Bearing Capacity (ksf)	Service Bearing Capacity (ksf) Based on 1" of Settlement
6	17.3	11.5
9	20.2	9.2
12	23.3	8.2
15	26.4	7.5
18	29.4	7.2
21	32.2	7.0

Lateral Earth Pressure Coefficients and Soil Parameters

Parameter	Value
Backfill Unit Weight (γ)	130 pcf
Backfill Soil Friction Angle (ϕ_f)	36°
Active Earth Pressure (K_a)	0.26
At Rest Earth Pressure (K_0)	0.41
Bearing Soil Friction Angle (ϕ_f)	36° at Pier 1, 29° at Pier 2
Passive Earth Pressure (K_p) - Unfactored	3.85
Coefficient of Sliding	0.73 at Pier 1, 0.55 at Pier 2
Seismic Coefficient (K_{ae})	0.28

Shear Modulus versus Foundation Soil Strain

Pier 1

Shear Modulus, G	Strain	Poisson's ratio, μ
500 to 1500 ksf	0.2 to 0.02 %	0.35

Pier 2

Shear Modulus, G	Strain	Poisson's ratio, μ
280 to 835 ksf	0.2 to 0.02 %	0.35

SR 395 Northbound Overcrossing at Parksmith Drive/BNSF

Pier 1Bearing Capacity

Maximum Footing Elevation : 1930'

Footing Width (ft)	Ultimate Bearing Capacity (ksf)	Service Bearing Capacity (ksf) Based on 1.5" of Settlement
6	60	19
9	69	13.5
12	76	10.5
15	83	9.0
18	91	7.5
21	99	7.0

Piers 2 and 3 Bearing Capacity

Pier 2 Maximum Footing Elevation : 1917'

Pier 3 Maximum Footing Elevation* : 1930'

* Requires embankment construction from existing ground elevation to footing elevation. See Figure 10 in Appendix E.

Footing Width (ft)	Ultimate Bearing Capacity (ksf)	Service Bearing Capacity (ksf) Based on 1.5" of Settlement
6	25.0	11.5
9	30.0	8.25
12	35.0	6.75
15	40.0	6.0
18	45.0	5.25
21	50.0	4.75

SR 395 Northbound Overcrossing at Market Street

Pier 1 Bearing Capacity

Footing Width (ft)	Ultimate Bearing Capacity (ksf) Footing at or below elevation 1950'	Ultimate Bearing Capacity (ksf) Footing at approx. elevation 1960' *	Service Bearing Capacity (ksf) Based on 2" of Settlement Footing at or below elevation 1950'	Service Bearing Capacity (ksf) Based on 2" of Settlement Footing at approx. elevation 1960' *
6	19.5	7.9	16.0	20.0
9	23.1	11.9	11.0	14.0
12	26.8	15.8	9.0	11.0
15	30.5	19.8	8.0	9.0
18	34.3	23.7	7.0	8.0
21	37.9	27.7	6.5	7.5

* Footing elevation at approximately elevation 1960' assumes the footing is placed within the embankment fill and meets the requirements of Figure 9.5.1-1 of the BDM.

Pier 2 Bearing Capacity

Maximum Footing Elevation : 1950'

Footing Width (ft)	Ultimate Bearing Capacity (ksf)	Service Bearing Capacity (ksf) Based on 2" of Settlement
6	19.5	13.0
9	23.1	10.0
12	26.8	8.0
15	30.6	7.0
18	34.4	6.25
21	38.1	5.75

Lateral Earth Pressure Coefficients and Soil Parameters

Pier 1, Footing at approx. elev. 1960'

Parameter	Value
Backfill Unit Weight (γ)	130 pcf
Backfill Soil Friction Angle (ϕ_f)	36°
Active Earth Pressure (K_a)	0.26
At Rest Earth Pressure (K_0)	0.41
Bearing Soil Friction Angle (ϕ_f)	36°
Passive Earth Pressure (K_p) - Unfactored	1.45
Coefficient of Sliding	0.73
Seismic Coefficient (K_{ae})	0.28

Lateral Earth Pressure Coefficients and Soil Parameters

Piers 1 and 2, footing elevations at approx. elev. 1950'

Parameter	Value
Backfill Unit Weight (γ)	130 pcf
Backfill Soil Friction Angle (ϕ_f)	36°
Active Earth Pressure (K_a)	0.26
At Rest Earth Pressure (K_0)	0.41
Bearing Soil Friction Angle (ϕ_f)	30°
Passive Earth Pressure (K_p) - Unfactored	3.85
Coefficient of Sliding	0.58
Seismic Coefficient (K_{ae})	0.28

Shear Modulus versus Foundation Soil Strain

Piers 1 and 2

Shear Modulus, G	Strain	Poisson's ratio, μ
278 to 835 ksf	0.2 to 0.02 %	0.35

SR 395 Northbound Overcrossing at Parksmith Drive/BNSF

Pier 1Bearing Capacity

Maximum Footing Elevation : 1930'

Footing Width (ft)	Ultimate Bearing Capacity (ksf)	Service Bearing Capacity (ksf) Based on 1.5" of Settlement
6	60	19
9	69	13.5
12	76	10.5
15	83	9.0
18	91	7.5
21	99	7.0

Piers 2 and 3 Bearing Capacity

Pier 2 Maximum Footing Elevation : 1917'

Pier 3 Maximum Footing Elevation* : 1930'

* Requires over-excavation to elevation 1920' and backfilling with gravel borrow, and compacting in accordance with Method C compaction, to elevation 1930'.

Footing Width (ft)	Ultimate Bearing Capacity (ksf)	Service Bearing Capacity (ksf) Based on 1.5" of Settlement
6	25.0	11.5
9	30.0	8.25
12	35.0	6.75
15	40.0	6.0
18	45.0	5.25
21	50.0	4.75

SR 395 Northbound Overcrossing at Parksmith Drive/BNSF (cont.)

Lateral Earth Pressure Coefficients and Soil Parameters

Parameter	Value
Backfill Unit Weight (γ)	130 pcf
Backfill Soil Friction Angle (ϕ_f)	36°
Active Earth Pressure (K_a)	0.26
At Rest Earth Pressure (K_0)	0.41
Bearing Soil Friction Angle (ϕ_f)	32°
Passive Earth Pressure (K_p) - Unfactored	1.45
Coefficient of Sliding	0.6
Seismic Coefficient (K_{ae})	0.28

Shear Modulus versus Foundation Soil Strain

Shear Modulus, G	Strain	Poisson's ratio, μ
610 to 1830 ksf	0.2 to 0.02 %	0.35

SR 395 Northbound Undercrossing at Perry Street

Pier 1 Bearing Capacity

Pier 1 Maximum Footing Elevation : 1875'

Footing Width (ft)	Ultimate Bearing Capacity (ksf)	Service Bearing Capacity (ksf) Based on 1" of Settlement
6	44.0	18.2
9	53.0	13.2
12	62.1	10.5
15	70.9	9.0
18	79.3	8.0
21	97.2	7.2

Pier 2 Bearing Capacity

Pier 2 Maximum Footing Elevation : 1865'

Footing Width (ft)	Ultimate Bearing Capacity (ksf)	Service Bearing Capacity (ksf) Based on 1" of Settlement
6	79.4	37.5
9	97.5	27.5
12	115.4	22.5
15	132.7	20.0
18	149.1	18.5
21	164.6	17.0

SR 395 Northbound Undercrossing at Perry Street (cont.)

Pier 3 Bearing Capacity

Pier 3 Maximum Footing Elevation : 1885'

Footing Width (ft)	Ultimate Bearing Capacity (ksf)	Service Bearing Capacity (ksf) Based on 1" of Settlement
6	21.2	21.2*
9	31.8	20.5
12	42.4	16.5
15	53.2	14.0
18	63.8	12.5
21	74.4	11.5

* For the smaller footing sizes at Pier 3, the ultimate bearing capacity and service bearing capacity are the same. Settlements are estimated to be less than 1 inch.

Lateral Earth Pressure Coefficients and Soil Parameters

Parameter	Value
Backfill Unit Weight (γ)	130 pcf
Backfill Soil Friction Angle (ϕ_f)	36°
Active Earth Pressure (K_a)	0.26
At Rest Earth Pressure (K_0)	0.41
Bearing Soil Friction Angle (ϕ_f)	36° at Pier 1, 40° at Piers 2 and 3
Passive Earth Pressure (K_p) - Unfactored	3.85 at Pier 1, 1.45 at Pier 2
Coefficient of Sliding	0.73 at Pier 1, 0.84 at Piers 2 and 3
Seismic Coefficient (K_{ae})	0.28

Shear Modulus versus Foundation Soil Strain

Pier 1

Shear Modulus, G	Strain	Poisson's ratio, μ
625 to 1875 ksf	0.2 to 0.02 %	0.35

Piers 2 and 3

Shear Modulus, G	Strain	Poisson's ratio, μ
823 to 2469 ksf	0.2 to 0.02 %	0.35